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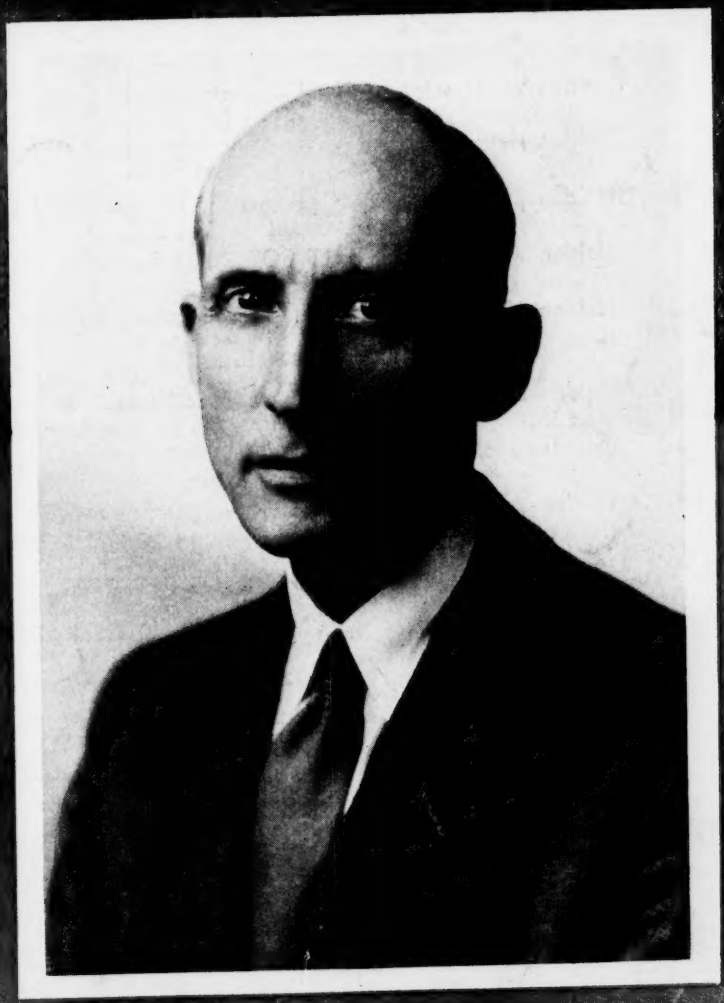
Metals Review



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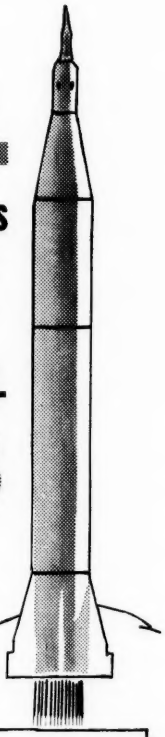

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John B. Johnson Retires From Air Research Laboratory

JOHN B. JOHNSON has retired from his position as technical director of the Aeronautical Research Laboratory, Wright Air Development Center. From the time of his employment in 1916 as an inspector of airplanes and engines for the Aviation Section of the Signal Corps, National Bureau of Standards, until his retirement, Mr. Johnson's performance has been distinguished and outstanding. He has been greatly responsible for many of the advances in materials which have permitted the U. S. Air Force to obtain its present status.

In 1918, Mr. Johnson went to McCook Field, Dayton, Ohio, and formed the nucleus of what has since become the Materials Laboratory of Wright Air Development Center. He has served as chief of the Materials Laboratory for over a quarter of a century, responsible for test procedures and all materials and processes used on military aircraft. The progress from wood and fabric aircraft to the present all-metal construction has been possible through the development of better materials, the potentialities of which he foresaw, and initial tests and final adoption which he sponsored.

From his work on the development of low-alloy steels, the present 4100 series of chromium-molybdenum steels was established. These steels are used throughout the world and are still preferred for welded structures. In 1939 he received the James Turner Morehead Medal of the International Acetylene Association for outstanding accomplishments in this field. He is author of the 400-page book "Airplane Welding and Materials", the second edition of which appeared in 1941, and about 50 papers published in technical journals.

Mr. Johnson, an A.S.M. member for 19 years and a member of the Metals Handbook Committee, pioneered research leading to the development of the deep hardening 4300 series steels, the only steels for which critical alloying elements were allocated during World War II. He holds a patent for case-hardened armor plate and, as early as 1930, he initiated work on the use of high-temperature alloys for aircraft power plants and has since been one of the most active leaders in the field of high-temperature alloys.

Throughout World War II, critical shortages of aircraft materials, adoption of new production methods and approval of new and alternate materials presented problems requiring immediate engineering decisions. A large proportion of these decisions were made by Mr. Johnson. His laboratory made one of the first critical evaluations of the national emergency (low-alloy) steels and established the controls for their application in the aircraft program. Through the judicious use of these steels, the limited supply of critical alloying elements was materially extended and reflected in the higher maintenance of production schedules without at any time jeopardizing the safety of military aircraft. For this work Mr. Johnson received the Exceptional Meritorious Service Award from the Secretary of War.

His ability in matters pertaining to aircraft materials has been repeatedly recognized through appointments as U.S.A.F. representative on numerous committees, including 23 years on the N.A.C.A. He has been active in the Society of Automotive Engineers for 25 years and in the work of the American Society for Testing Materials and the American Welding Society for many years.

In December 1949, Mr. Johnson became chief of the Metallurgy Research Branch of the then Office of Air Research, now the Aeronautical Research Laboratory. Recognizing the need for more intensive research in the field of high-temperature materials, utilizing metal-ceramic combinations, and realizing that several German specialists assigned to this laboratory had formerly made important contributions along these lines, Mr. Johnson planned and put into effect a program whereby laboratory facilities were made available to them. He directed the activity to include work on the metal and metal-oxide combinations of silicon, molybdenum, chromium, zirconium, boron and alumina.

In April 1954, Mr. Johnson was made chief scientist of the Aeronautical Research Laboratory, and in this capacity, he has continuously appraised the program to assure that it reflects changing requirements and advancements.

Mr. Johnson, because of his rich background and experience, has been a fruitful source of sound advice and council to the various branches of the Aeronautical Research Laboratory. The value of his consistent leadership has been continuously recognized and held in high esteem by his associates who have learned to appreciate in him a never-ending source of inspiration.

Mr. Johnson takes a personal interest in his fellow employees and they have a sincere respect for him personally as well as for his technical judgment. He is always available for consultation and advice, which is actively sought by people within the Department of Defense, from the newest employee to the highest ranking general.

Mr. Johnson's 42 years as a civil service employee have been most distinguished and a credit to the United States Air Force. His influence has been felt throughout the Department and throughout the world by his appointments to scientific panels within the North Atlantic Treaty Organization.

M.E.I. Training Attracts Metal Industry Interest

In recent months, industrial firms throughout the country have been giving additional consideration to employee training programs. Current economical developments have vividly emphasized the need for greater plant efficiency. Also, competitive advantages in maintaining a working force which is fully informed on new metals, methods and processes have become increasingly evident.

The home study and in-plant training division of the American Society for Metals, the Metals Engineering Institute, will be instrumental in meeting this need for modern, practical educational programs. "In fact, the insistent demand for better trained technicians, supervisors and production personnel was the basic reason for the creation of the Institute", Anton deS. Brasunas, director of M.E.I., said recently.

"For the first time, the metal industry has a source of well-organized educational material to meet the specific needs of any metalworking plant. M.E.I. courses can be put to work quickly and effectively in any plant producing or fabricating metals".

The plant training director, or his counterpart, can obtain M.E.I. courses specifically tailored to meet his firm's special requirements. Details of test grading, delivery of course material and all other operations can be channeled through one man selected as plant instructor. This man may be the plant metallurgist or another qualified metals engineer. In many cases, these are the men who initiate the use of M.E.I. courses to meet the demands for specialized training that they have recognized.

Because enrollment fees are based on the number of enrollees, it is economically possible to include not only plant personnel, but also members of the sales and administrative staffs who can benefit from an additional knowledge of metals. Fees include each enrollee's copy of the A.S.M. Metals Handbook which is used as a reference text.

A number of in-plant training programs are being carried on at this time, or have just recently concluded. Three groups have taken an M.E.I. course at General Electric Co., Cincinnati. One group at each of the following firms has recently completed courses—Sheffield Steel Co., Kansas City, Mo.; Cambridge Wire Cloth Co., Cambridge, Md., and Southern Research Institute, Birmingham, Ala. (See p. 72 for further M.E.I. information).

Talks on Cemented Carbide Dies

Shown at a Meeting of the Northwestern Pennsylvania Chapter Are, From Left: L. R. Maitland, Technical Chairman; A. E. Glen, General Electric Co., Who Spoke on "Cemented Carbide Dies"; G. E. Mohnkern, Chairman; and Otto Ehlers, Chapter Vice-Chairman and Program Chairman of the Meeting

Speaker: A. E. Glen
General Electric Co.

"Cemented Carbide Dies" was the subject of a talk given by A. E. Glen, manager, die sales, Metallurgical Products Department, General Electric Co., at a meeting of the **Northwestern Pennsylvania Chapter.**

Mr. Glen presented a short history of tungsten carbide, starting with its discovery by a Frenchman who did nothing more than report his findings. He then explained how, during World War I, the Germans found themselves without diamond draw dies and made use of the French report to develop the carbide which they found could be bound together with cobalt.

Tungsten carbide is made today from tungsten, lamp black and cobalt. The tungsten and lamp black are first united in a furnace at approximately 3000°, the cobalt binder is added and the mixture is pressed into the desired shape and presintered. The material, now in a chalk form, may be machined to more intricate forms in a process called preforming. The final step is to sinter the pieces in either a vacuum or a hydrogen atmosphere at a temperature of approximately 2600° F. During the sintering process, the pieces shrink 15 to 20% in linear dimensions and become a dense, hard, tough and homogenous metal which cannot be softened by any treatment.

The uses of this metal developed from draw dies to cutting tools, blank dies and cold forging dies as the manufacturers found how to control the processes and developed grades with different properties. The softest grade of carbide is still considerably harder than the hardest steel and can outwear any steel where breakage is not a problem.

The speaker then presented tips on the designing and use of tungsten carbide dies to replace steel parts. These include such things as being sure on blanking and draw dies that the carbide piece is large enough to take in all the wear area. He illustrated how to hold the carbide pieces by mechanical means rather than by brazing which is somewhat dangerous and cannot be proven as to quality without a destructive test. Packing or supporting of the carbide piece is also important if there is any pressure on the carbide. Emphasis was also put on the finish on the working part of the carbide and it was shown how this becomes more important as the pressures are increased.—**Reported by L. R. Maitland for Northwestern Pennsylvania.**

Tri-City Given Details On Hardness Measurement

Speaker: V. E. Lysaght
Wilson Mechanical Instrument Div.
American Chain & Cable Co., Inc.

Hardness in the broadest sense, and as applied to minerals and metals, is the cohesion of particles on the surface of a body as determined by its capacity to scratch another, or itself be scratched, according to Vincent E. Lysaght, general sales manager, Wilson Mechanical Instrument Division, American Chain & Cable Co., Inc., in a talk on "Hardness Measurement" given at a meeting of **Tri-City Chapter.**

Neither statute laws nor laws of physics have been able to clearly define this art, which dates back to 1900 when J. A. Brinell presented a paper on his ball test before the Swedish Society of Technologists. Depending on your calling, you might very well ask how does hardness testing affect the tool engineer and the metallurgist. To answer this query, Mr. Lysaght pointed out that hardness testing is considered by many experts as a must in practically all production operations as a "tool" or process for the nondestructive testing of metals in all stages of manufacture and fabrication.

Through the aid of a series of slides, the uses, advantages and limitations of such units as the Brinell, Rockwell, Rockwell superficial, 136° diamond pyramid and scleroscope, the most commonly used instruments for accurate determination of resistance to permanent indentation, were described, as well as several of the lesser known and the portable types.

The critical nature of proper testing of thin metallic sheets and cylindrical workpieces, as well as other special production techniques, were covered. The conversion of hardness scales was also touched upon as it is often desirable to convert from one scale to another. While conversion for different hardness values is of value to the metallurgist and the tool engineer, it should be used with care and discretion.

Importance of supports, particularly for irregular shapes, sheet metal, small items and round pieces, was stressed. It is a fundamental requirement when conducting such tests that the surface under scrutiny be approximately normal to the hardness tester's penetrator and that the object be held firmly in its proper position when the testing loads are applied.

The use of fully automatic hardness tests is expanding where high-quality inspection of mass-produced parts must be speeded up, and some units, such as the Rockwell and Brinell testers, are capable of giving up to 1000 readings per hr.

The talk was concluded with an explanation of microhardness testing techniques, which are currently receiving considerable attention in the tooling industry.—**Reported by Eric Welander for Tri-City.**

A.S.M. is the largest publisher of books for the metals industry in the world.

OBITUARIES

FRANK H. ADAMS, president of Surface Combustion Corp., died early in April. Mr. Adams was the president of the Industrial Furnace Manufacturers in 1929-1930 and of the Gas Appliance and Equipment Manufacturers in 1939-1940. He was also prominent in American Gas Association activities.

♦ ♦ ♦

GORDON DUNLAP, 51, died on Apr. 8 in Leonia, N. J. He was employed during his career by American Steel and Wire Co., American Brake Shoe Co. and Metals Disintegrating Co. During World War II he served in a technical capacity on the Manhattan District Project, and during the Korean War he was chief of the metallurgical development section in the New York office of the A.E.C. Mr. Dunlap was also a consultant in the atomic energy field.

♦ ♦ ♦

VSEVOLOD N. KRIVOBOK, well-known authority on stainless steels and supervisor of the stainless steel and heat-resistant alloy section, Development and Research Division, International Nickel Co., Inc., died on May 17 after a brief illness. He was 65.

Born in Poltava, Russia, Dr. Krivobok was a naturalized U. S. citizen. A graduate of St. Petersburg Polytechnic Institute in Russia in 1916, he attended Harvard University where he received a B.S. degree in metallurgy in 1921, a degree in metallurgical engineering in 1922 and a Ph.D. degree in 1924.

Prior to joining International Nickel in 1944, Dr. Krivobok had been director of research and chief metallurgist at Lockheed Aircraft Corp., Burbank, Calif., a member of the faculty and professor of metallurgy at Carnegie Institute of Technology, associate director of research, Allegheny Ludlum Steel Corp., and a member of the Metallurgical Research Bureau of Carnegie Tech.

Dr. Krivobok contributed greatly to the scientific knowledge of stainless steels during the early stages of their development. Subsequent technical contributions in this field made him a recognized authority both on this continent and abroad. He was the 1934 Campbell Memorial Lecturer and presented the Sauveur Memorial Lectures for the A.S.M. in 1939 and 1943. Dr. Krivobok, a past national trustee A.S.M. (1943), was a member of A.I.M.E., A.S.T.M., A.W.S., the British Iron and Steel Institute and the British Institute of Metals.

V. N. Krivobok

♦ ♦ ♦

JAMES D. GLENN, 52, former vice-president and general manager of sales, Crucible Steel Co. of America, died May 8 after a long illness. Active in the steel industry since 1922, Mr. Glenn joined Crucible in 1948 in Pittsburgh as general manager of stainless steel sales and was named general manager of sales in 1954. The next year he was elected vice-president and general manager of sales for the company, retiring last year because of ill health.

♦ ♦ ♦

POLYKARP HERASYMENKO, research professor at New York University's College of Engineering, died suddenly on Apr. 6 at the age of 57. He had been associated with New York University since 1952, conducting fundamental research in process metallurgy, titanium metallurgy and thermodynamics. Born and educated in the Ukraine, Dr. Herasymenko did extensive research work in Europe before coming to the U. S. in 1951.

Carolinas Features Talk on Nitriding

Carl F. Floe, The Nitralloy Corp. and Massachusetts Institute of Technology, Presented a Talk on "Nitriding" at a Meeting of the Carolinas Chapter. Shown are, from left: Rudy Polivka, chairman; Bill Austin, secretary; Dr. Floe; and Albert Fairchild, past chairman of the Carolinas Chapter

Speaker: Carl F. Floe

The Nitralloy Corp.
Massachusetts Institute of Technology

Carl F. Floe, professor of metallurgy and administrative vice-chancellor, Massachusetts Institute of Technology, and associate technical director, The Nitralloy Corp., presented a talk on "Nitriding" at a meeting of the **Carolinas Chapter.**

Dr. Floe covered the subject of nitriding briefly, including surface reactions between the nitriding agent and the steel, and the mechanism of nitriding, including the structure of the case. Particular emphasis was placed on methods for the control of the depth of white layer, which is very important if the parts are to be placed in service in the as-nitrided condition. The most popular method for control of the depth of white layer is to divide the nitriding cycle into two stages. In the first stage, the ammonia dissociation is kept low (from 15-25%), in the second stage, it is increased to approximately 85%. This stage is a diffusion cycle, during which the depth of white layer is decreased by diffusion of the nitrogen into the steel. With proper control, the depth of white layer can be reduced to a maximum of 0.0004 in. in the second stage. If the white layer is no deeper than this, there is no tendency for it to chip or pit in service, and such a surface makes an ideal "run-in" surface for new parts.

Comparisons were made between the properties of the Nitralloy grades of steel versus the nitrided AISI steels, such as 4140 and 4340. The latter are nitrided successfully, but the hardness obtained is much lower than for the Nitralloy steels. The tempering practice prior to nitriding for the AISI steels must be carefully controlled to make sure that the chromium is available for nitride hardening, rather than being tied up in the carbide phase.

Nitriding of toolsteels, stainless steels and other high-alloy steels was described briefly. A lively discussion period followed the lecture.

A.S.M. spends $44.50 to service each member of the Society for a period of one year.

Meet Your Chapter Chairman

GOLDEN GATE

WALLACE J. ERICHSEN was born in Santa Clara Valley and is a graduate of Stanford University with the degrees of A.B. in engineering and M.S. in metallurgical engineering. He was formerly with Joshua Hendy Iron Works as metallurgist in materials and process control and nondestructive testing, and is now engineering section manager of the Sunnyvale Division, Westinghouse Electric Corp.

W. J. Erichsen

Mr. Erichsen is a member of the national nominating committee of the American Welding Society and has held offices in other technical societies as well as having been chairman of the educational committee and vice-chairman of the Golden Gate Chapter.

For recreation he and his wife enjoy camping, swimming and traveling with their family of two girls and two boys.

LEHIGH VALLEY

LEON J. MCGEADY, native of Bethlehem, Pa., has the degrees of B.S., M.S. and Ph.D. from Lehigh University. All his work has been in teaching, research and consulting, and he is now professor and head of metallurgical engineering at Lafayette College.

Chapter activities include chairman of the educational and student affairs committee, treasurer and member of the executive committee. He is also an active member of the American Welding Society.

Prof. McGeady and his wife, the former Anne Marie Peters, have six children, three boys and three girls, which gives him excellent opportunity to follow his favorite hobby, photography. He also enjoys golf.

FORT WAYNE

ANDREW VAN ECHO was born in Barton, Ohio. He received his B.S. degree in metallurgical engineering from Ohio State University, where he was on the wrestling team.

Before taking his present position as manager of processing and quality control with Joslyn Stainless Steels, he served as metallurgical observer at U. S. Steel Corp., and research associate with the Manhattan Project. He has also been a technical service representative and assistant wire mill superintendent and assistant to president and works manager.

Mr. Van Echo has served on a special committee of A.S.T.M. and is an officer in other technical societies as well as having been chapter secretary and vice-chairman. He enjoys golf and is an interested spectator of baseball, football and basketball games, especially when it is an Ohio State team.

He and his wife, the former Elizabeth Jane Lauer, have one son David, ten years old.

WASHINGTON, D. C.

HENRY E. STAUSS, consultant for the solid state division of the Naval Research Laboratory, was born in St. Louis, Mo. He has an A.B. degree from Washington University, St. Louis, and M.S. and Ph.D. degrees in physics from the University of California. He was also a national research fellow at Chicago University.

Physics has been Dr. Stauss' life-

H. E. Stauss

time career, starting as instructor at Nebraska University, and later research physicist and metallurgist with Baker & Co. He was also with the War Production Board as industrial specialist. He is a member of a number of technical societies and has served on the Washington Chapter's executive committee for four years. He has a son and daughter and enjoys gardening.

CALUMET

THOMAS A. FOSS is a native of Chicago. His degree in mechanical engineering is from Cornell University where he was active in track. He started work as a departmental trainee, moved on to general foreman and is now assistant superintendent in the rail accessories department for Inland Steel Co.

He has been active in chapter affairs as chairman of the membership, finance and program committees and was also secretary, treasurer and vice-chairman. He takes an interest in civic matters as a member of the East Chicago Chamber of Commerce. During World II he took training in aviation and was discharged from the Navy as an aviation cadet.

Mr. Foss is married and has two sons, Timothy, 4, and David, 2 years old.

TEXAS

CURTIS L. HORN, an A.S.M. member since 1947, has served as secretary-treasurer, vice-chairman and on the executive committee of the Texas Chapter. He was born in Monessen, Pa., and studied first at the University of Pittsburgh, later acquiring a degree in metallurgical engineering from the Colorado School of Mines.

Curt was active in golf and tennis during his college days, and still follows these sports as recreational interests. His vocational beginning was as senior metallurgist and he is now metallurgical staff assistant with Hughes Tool Co. During World War II he served two years overseas as first lieutenant in the combat engineers. His one son, Scott, is 11, and daughter Susan is 9 years old.

Intercrystalline Fracture Explained at Penn State

Speaker: E. S. Machlin
Columbia University

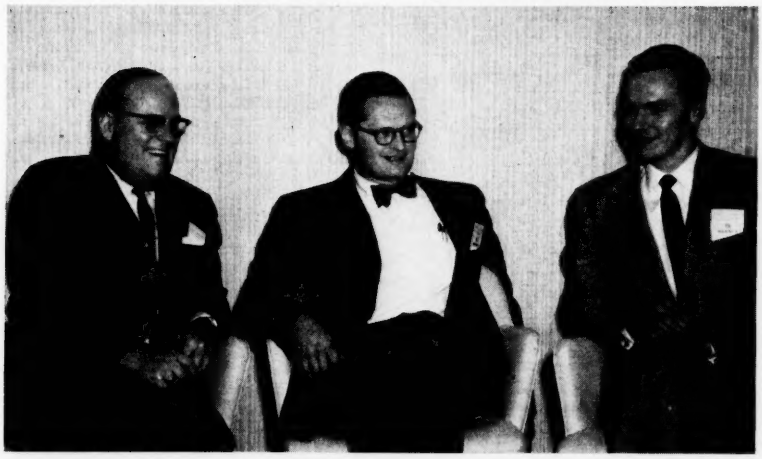
Eugene S. Machlin, professor of metallurgy, Columbia University, spoke on "High-Temperature Intercrystalline Fracture in Metals" at a meeting at **Penn State.** Dr. Machlin restricted his talk to fracture that occurs above the equicohesive temperature of the material.

About 30 years ago it was believed that creep rupture was manifested by voids which are formed by groups of vacancies. Later investigations showed that the probability of the existence of such voids is very small, therefore some other mechanism had to be operative.

Dr. Machlin discussed the theory relating high-temperature-intercrystalline fracture to grain-boundary sliding as one of the mechanisms which causes high-temperature failure. When grain-boundary jogs are subjected to shear stresses at high temperatures, intercrystalline cracks are developed in the material. The formation and growth of these cracks lead to the rupture of the specimen.

The speaker supplemented his talk with numerous slides which illustrated the main features of this theory. — **Reported by Richard A. Heacox for Penn State.**

Outlines Effects of Radiation



J. C. Wilson, Oak Ridge National Laboratory, Spoke on "Radiation Effects on Structural Materials" at Canton-Massillon. Shown are, from left: G. B. Trumble, chairman; Mr. Wilson; and J. R. Berens, technical chairman

Speaker: J. C. Wilson

Oak Ridge National Laboratory

The testing of effects of radiation on metals is complicated. Research is performed in a new environment and the irradiated material must be measured by a new set of standards. The above statements were enlarged upon by J. C. Wilson, chief, radiation metallurgy group, Oak Ridge National Laboratory, in a talk given before the **Canton-Massillon Chapter** on "Radiation Effects on Structural Materials".

Irradiation by fast neutrons affects slip in material, hardens, speeds up age hardening and gradually decreases damping capacity. Electrical resistivity, shear strength and yield strength are also affected. These properties may be restored by annealing, but at widely differing temperatures.

In austenitic stainless steel, the effect is similar to cold work or precipitation hardening. In carbon steel, the sensitivity is structure dependent. Data show that presence of iron carbide in normalized condition causes carbon steel to be less sensitive. Carbon content over 0.20% has been found less sensitive than steels around 0.10%. Fine grain is found to be less resistant to change. Variation of transition temperature in pressure vessels depends on neutron dosage.

Chromium-nickel stainless with 1 to 2% boron possesses high cross-section for thermal neutrons and can be used for shielding in pressure vessels.

Much study is yet required. However, Mr. Wilson concluded, the results will be used as a research tool to speed up the atomic diffusion process. The meeting was closed with an interesting question period.—**Reported by G. L. Perkins for Canton-Massillon.**

Presents Details on Heat Treatment of Toolsteels

Speaker: Robert C. Stewart

Vanadium-Alloys Steel Canada Ltd.

Members of **Ottawa Valley** heard a talk on the "Heat Treatment of Toolsteels", by Robert C. Stewart, chief metallurgist, Vanadium-Alloys Steel Canada Ltd.

Mr. Stewart reviewed the history of the consumption of high speed steels in Canada. There has been a great change since 1940, before which most of the toolsteels used in Canada were manufactured in Great Britain. The many types and qualities of steels available made selection difficult. Further, most of the steels were made in crucibles in melts of 60 lb. and the whole of the ingots made into bars. This practice of using the entire ingot made it possible, formerly, to buy a bar of "Supreme" quality steel which had been made from the top or bottom of the ingot, but it was of significantly inferior grade.

World War II reduced the amount of high speed steel available from Britain and Canadians began to use United States steels and to make more themselves. The Americans made fewer types of steel and the cost depended not so much on the ingredients as on the part of the ingot from which the bar came, the ends, of course, being the cheapest.

A system of classification was gradually built up in which the steels were grouped according to their main characteristics, such as wear and shock resistance, and to their uses, such as cutting, drawing and rolling.

Early heat treatment equipment was fairly primitive, consisting merely of gas-fired furnaces normally used for heat treating plain carbon steels. There was no protective atmosphere and the surfaces of the toolsteels became decarburized and softened. Furnaces with controlled atmospheres were introduced but all of these had their difficulties. Finally salt baths were developed and they are now the standard furnaces used for heat treatment of toolsteels. Modern salt bath furnaces are very efficient and may be run continuously for over a year.

Mr. Stewart discussed design in relation to efficient heat treatment. Too often pieces presented for heat treatment have sections of widely differing thickness. When such pieces are quenched, the thicker sections harden and expand more slowly than the thinner sections. The thin sections are thus stressed while they are brittle, the least desirable time for stressing, and often fracture. Frequently it is possible to reduce the thick sections by drilling holes so that the thickness of the metal is kept fairly constant throughout the part. Otherwise, it may be possible to redesign the part, making it composite if necessary, since it is better to have two parts by design rather than by accident.

Pieces which cannot be redesigned are usually hardened by interrupted quenching although not all steels can be treated in this way.

Various types of quenching baths were discussed. Aerated water forms cushions of gas on the surface of the metal giving bad quenching. Brine gives better results because the addition of the salt expels some of the dissolved gases. However, fresh brine must be left in for 24 hr. to allow the expulsion of the gases. Sodium hydroxide solution is even more effective because it neutralizes carbon dioxide in the water.

Mr. Stewart concluded by reviewing some of the actual steels in use. High-carbon and high-chromium steels are very wear resistant but are difficult to harden. They require a carefully controlled atmosphere to prevent decarburization, and any overheating causes shrinkage due to retained austenite. The best known high speed steel, the 18-4-1 type, is easy to harden, as are the high-molybdenum steels used for twist drills. High-carbon, high-vanadium steels have gained greatly in importance in recent years.—**Reported by E. Smith for Ottawa Valley.**

The annual meeting of the **Manitoba Chapter,** held at Vasalund Park, included the reports of committees and the election of new officers for the coming season. The business meeting was preceded by a reception and a smorgasbord, and following the business meeting the members, guests and their wives enjoyed dancing and entertainment.—**Reported by J. E. Graver for Manitoba.**

Discusses Metal Beryllium

A. R. Kaufmann (Left), Nuclear Metals, Inc., Spoke on "Beryllium—Its Potentialities and Problems" at a Meeting Held in Washington. He is shown with Henry Stauss, Naval Research Laboratory, the chairman

Speaker: A. R. Kaufmann
Nuclear Metals, Inc.

At a meeting of the **Washington Chapter,** A. R. Kaufmann presented a talk on "Beryllium—Its Potentialities and Problems".

The properties of beryllium were discussed and Dr. Kaufmann indicated that the metal has received consideration for aircraft, missile and nuclear applications. Although a relatively rare material, 100 tons per year could be easily supplied, and this production could be increased if the demand warranted. Efforts to develop beryllium as an engineering material over the past 50 years have fallen short due to the inherent brittleness of the metal. Beryllium is suitable for some nuclear reactor applications where engineering properties are not a factor. The metal has a low neutron capture cross section, slows down neutrons, and has a high scattering effect.

Beryllium is produced by two techniques—powder metallurgy and casting. The powder metallurgy process produces fine grain size, good machinability, and elongations of 1 to 2%. The casting process produces larger grain size, zero elongation and poor machinability. Early fabrication efforts indicated that greater elongations in powdered beryllium products could be achieved in the direction of working by extrusion methods. This first significant improvement in ductility was believed to result from preferred orientation of crystals and fine grain size.

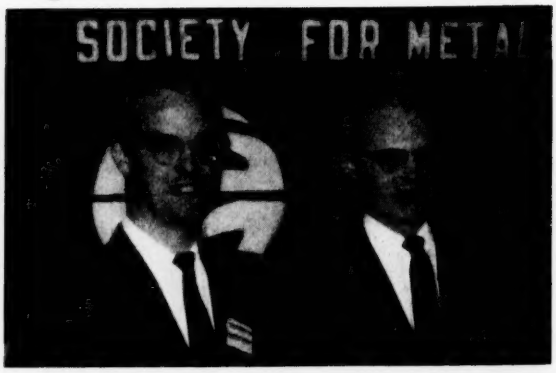
Studies showed that beryllium, which has a hexagonal close-packed lattice structure, has one primary slip system (i.e., type L prism planes (1010)). Twinning occurs only on the (1012) plane. Hot working tends to align the basal planes parallel to the direction of working. This is important as it indicates a possibility of producing ductile products. Special sheet materials produced by extrusion and cross-rolling of powdered products have been made which showed elongations of 30 to 40% in the plane of the sheet in any direction. These elongations were obtained with standard sheet tensile specimens stressed under uni-axial loading. When loaded bi-axially, the material proved brittle by accurate control of grain size, development of suitable texture and selective orientation of crystals, it should be possible to develop material which would provide elongations of 5% and be able to deform plastically to a small extent under bi-axial stress.

Extensive investigations have been conducted to determine the effect of oxygen on beryllium. Results to date have been completely negative in establishing oxygen as the cause of brittleness. Also, there is no assurance that freedom from impurities will provide ductile beryllium.

Studies have shown that no element forms extensive solid solutions with beryllium; however, limited solubility is obtained with the transition elements. The highest solubilities are those obtained with copper, gold and silver. Excessive alloying causes the formation of brittle, intermetallic compounds.

In conclusion, Dr. Kaufmann stated that although there is little hope that beryllium can be made a truly ductile metal, there is a good possibility that it can be developed into a useful enggineering material. — **Reported by Roy M. Gustafson for Washington.**

Speak at Worcester Meeting



Leaders Who Spoke at an Educational Meeting Held by the Worcester Chapter Were Roy F. Bourgault (Left), Worcester Polytechnic Institute; and Rudolph H. Johnson, Babson Institute of Business Administration

Cladding of Metals Is Subject at Wilmington

Speaker: J. G. Althouse
Lukens Steel Co.

J. G. Althouse, chief metallurgist, Lukens Steel Co., spoke on "Cladding of Metals" in Wilmington.

Mr. Althouse presented a brief history of the development of clad steels. In the early 1930's, Lukens made an agreement with the International Nickel Co. whereby clad plates were experimentally produced. The clad portion consisted of a nickel-base alloy metallurgically bonded to carbon steel by means of heat and pressure.

J. G. Althouse

There are now many methods of producing clad steels, such as by welding protective-type alloy to backing plate, by electroplating, and by heat and pressure. Through experimental and research work, various processes have been developed to ensure good bonding between the clad material and the backing steel. Since the development of clad steels, the industry has developed specifications to guide in its manufacture. Samples of various types of clad, from austenitic stainless steel clads to copper, aluminum and other nonferrous types of clads, were shown.

Mr. Althouse then reviewed the research that is being done in the field, stressing the effort being placed on producing clads from combinations of heat and corrosion resistant steels with carbon or low-alloy backing steels.—**Reported by Liston Noble for Wilmington.**

Reviews Ferrous Metallurgy Research

R. H. Aborn, U. S. Steel Corp., Described "Advances in Ferrous Metallurgy Research" at Oak Ridge. He is shown, center, with William S. Dritt, vice-chairman (left), and E. E. Stansbury, University of Tennessee (right)

Speaker: R. H. Aborn

U. S. Steel Corp.

R. H. Aborn, director, Edgar C. Bain Laboratory for Fundamental Research, U. S. Steel Corp., described "Advances in Ferrous Metallurgy Research" at a meeting in **Oak Ridge.**

Dr. Aborn's preliminary remarks dealt with the changes in basic scientific ideas which have occurred during the last generation. The advances can be placed in five categories: Ore concentration and steel production; vacuum treating; recovery of waste products; new steel products; and new concepts and techniques in research.

Low-grade taconites are now being concentrated to the point that they are richer than high-grade Mesabi ores. By using a high proportion of this sintered charge, productivity is increased as much as 20%.

Blast furnaces are still the most economical vehicles of production, and the economical availability of oxygen, allowing a 6% increase in oxygen in the air blast, has increased productivity of ferromanganese blast furnaces up to one-third. The open-hearth is still the most versatile method of steelmaking but basic oxygen processes are gaining much favor. There is a good deal of interest in the possible commercial applicability of the direct reduction processes for steelmaking. Here, powdered iron ore concentrates are reduced in a fluidized bed by such gases as hydrogen and carbon monoxide.

Air melted-vacuum cast steel ingots up to 95 in. in diameter and 180 tons in weight have been produced. They are characterized by very low gas content and superior properties. Vacuum melted and cast ingots as large as 26 in. in diameter are made using the consumable electrode process. This method has the added advantage of minimizing segregation. Vacuum induction melting is more versatile but limited so far to smaller heats. Electron bombardment beam melting has been done on a laboratory scale. The "beam" method is especially handicapped by the fact that it must be done at 0.1 microns or less. Vacuum methods can reduce the combined hydrogen-nitrogen-oxygen content to ±15 ppm.

The recovery of waste products from the steel industry has become a big business. A large number of coal chemicals are recovered from the coking process. One of the newest examples is the recovery of hydrogen and its combination with nitrogen from air to make 2000 tons of anhydrous ammonia per day.

New products in the industry include plastic coated steel, aluminum coated wire and sheet steels with surfaces chemically treated to give better corrosion resistance. Steels of 300,000 psi. tensile strength are being made for the aircraft and missile industry. Die steels of 370,000 psi., and corrosion resistant stainless steels of 250,000 psi., are being made.

New techniques in research include the electron probe microanalyzer, electron microscopy and diffraction, neutron diffraction and radioactive tracers. These techniques will lead to many advances in ferrous metallurgy technology.

Dr. Aborn predicted that the next decade will see as many if not more advances, not only in ferrous metallurgy and metallurgy in general, but in all the fields of science.—**Reported by P. L. Rittenhouse for Oak Ridge.**

Cleveland Members Hear Congresswoman

Congresswoman Frances P. Bolton Presented a Talk on "Our Washington World" at the Combined Business Meeting and Ladies Night Held by the Cleveland Chapter. Chairman Kenneth Humberstone is shown presenting a plaque of appreciation to Mrs. Bolton, while Anton Brasunas (left), director, M.E.I., and Charles Campbell, the past chairman, look on

The **Cleveland Chapter** made its Annual Meeting a Ladies Night. After in-coming chairman, Ken Humberstone, accepted the gavel from retiring chairman, Charles Campbell, the group heard Congresswoman Frances P. Bolton talk on politics in Africa and current legislation in Washington.

Sne told of many personal experiences encountered during her travels through Africa, Israel and the Middle East. In speaking of the cold war, she emphasized the fact that Russia cannot be trusted in international politics and that we must be constantly on guard against the Russian government's published aims of eventually controlling the world by peaceful means if possible, by war if necessary. Concerning the planned summit conference, she voiced her opinion that unless careful and cautious groundwork is laid, it could well prove to be politically profitable to the Russians. They have already arranged to see western ambassadors separately where deals could be arranged that might cause the Western Powers to grow apart.

Congresswoman Bolton also touched upon the American educational system, and suggested that we consider the home as an important part of a child's educational environment.—**Reported by Fred L. Siegrist.**

Cast Irons Topic at Eastern New York

J. F. Wallace, Case Institute of Technology, Discussed "Cast Irons" at a Meeting in Eastern New York. Shown are, from left: L. J. DiNuzzo, American Foundrymen's Society Chairman; Prof. Wallace; Wylie J. Childs, Technical Chairman of the Meeting; and A. A. Burr, the Chapter Chairman

Speaker: J. F. Wallace
Case Institute of Technology

J. F. Wallace, associate professor of metallurgical engineering, Case Institute of Technology, discussed "Cast Irons" at a meeting of **Eastern New York Chapter.**

The speaker compared the engineering properties of gray cast iron, nodular iron and malleable iron to those of plain carbon steel. The cost of cast iron is generally higher than raw steel, but when compared with the cost of a finished product or part, cast iron will often do a specific job more cheaply than steel.

Figures show that in 1955 some 14 million tons of gray and nodular iron, 1.1 million tons of malleable iron and 1.5 million tons of cast steel were produced.

Mr. Wallace discussed the three main types of cast iron and correlated properties to microstructure. A range of tensile properties can be obtained in gray iron by varying the matrix. Tensile strengths of 20,000 psi. for a ferritic matrix, 45,000 psi. for a pearlitic matrix and 60,000 psi. for a bainitic matrix can be attained. The matrix is adjusted by varying the cooling rate and alloying elements.

Nodular iron has different engineering properties than gray iron because of the shape of the graphite particles. The graphite particles exist as spheroids in nodular iron whereas they are plate or flake-like in gray iron. Therefore, nodular iron has a straight stress-strain curve, a higher modulus of elasticity, and improved ductility and toughness. This change in graphite shape also results in more notch sensitivity, less damping capacity and a tendency towards slightly less wear resistance. Malleable iron has the graphite collected in agglomerated, irregular nodules that are produced by annealing white iron rather than directly from the melt as with nodular iron. The properties of ferritic and pearlitic malleable iron are generally similar to nodular iron with similar matrix structures except for the outstanding machinability of malleable. — **Reported by Louis Ianiello for Eastern New York Chapter.**

Nuclear Congress Scheduled for April 1959

The Fifth Nuclear Congress (of which the A.S.M. is one of the sponsoring organizations) will be held in Cleveland the week of Apr. 5, 1959. Its aim is to exchange information between scientists, engineers and managers in all fields of nuclear engineering and technology. The objective will be assured by co-sponsorship of 30 national scientific and engineering societies, the National Industrial Conference Board and the Atomic Industrial Forum.

Papers on metallurgical aspects of atomic power plants, on the use of radioactive isotopes in research, fabrication or testing of metallic substances, and on related topics are being solicited.

Members of A.S.M. who wish to contribute papers should write to Ted Dumond, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

At Rome Educational Series Lecture

Cary E. Hohl, Technical Sales Representative, Sperry Products Inc., Spoke on the "Ultrasonic Inspection of Metals" at a Meeting in Rome. Mr. Hohl, center, is shown demonstrating a portable reflectoscope to his audience

Speaker: Cary E. Hohl
Sperry Products, Inc.

Cary E. Hohl, Sperry Products, Inc., spoke on "Supersonic Inspection of Metals" at an educational meeting of the **Rome Chapter.** A movie demonstrating the applications of supersonic inspection in industry was also shown.

In testing raw materials, finished products, machinery and componets with the high-frequency sound waves normally used, the source must be placed directly over a flaw before it becomes apparent. Ultrasonic waves, however, travel a jagged path through the plate by successive reflections between the surfaces of the material until either a structural discontinuity or flaw is reached. The reflected beam then returns to a transducer by a similar path. The echoes are instantly converted into a visual presentation on the screen of a cathode-ray tube. The pattern or size and position of the peak on the oscilloscope screen indicates the distance of the flaw from the transducer and the relative size of the reflecting area.

It was clearly shown by information given by Mr. Hohl that ultrasonic inspection can reduce or eliminate waste, prevent expensive machining of faulty materials, insure product perfection, maintain machine operations inexpensively and safely, and broaden profits.

Mr. Hohl emphasized that materials, parts and products of today are subjected to greater strains than ever before. Thus, specifications have grown more rigid, tolerances have become narrower and guesswork is definitely out of the question.

The speaker concluded the meeting with a question period.—**Reported by John M. Haniak for Rome Chapter.**

Powder Rolling Discussed

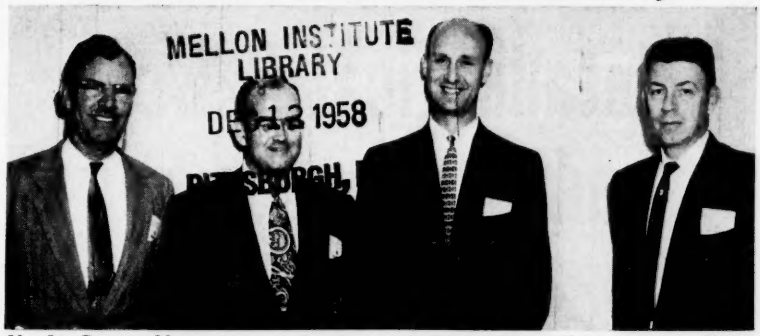
Speaker: Samuel Storchheim
Metals Research and Development Inc.

Members of the **Northeast Pennsylvania Chapter** heard one of their own members, Samuel Storchheim, president and technical director, Metals Research and Development Inc., speak on "Powder Rolling of Metals".

Mr. Storchheim's talk included the history, development and advantages of this relatively new fabrication technique of direct rolling of metal powders into finished sheet.

Sheet material, so produced, has been found to have superior physical and mechanical properties to those of sheet conventionally fabricated. In addition, potential money savings are possible, as well as low capital investment costs for setting up powder rolling plants. The effect of a number of variables regarding this new powder metallurgy process was discussed, including such areas as: powder properties; rolling variables; the effects of heat treatment and further cold rolling; and finally, strip properties.—**Reported by R. L. Ward for Northeast Pennsylvania.**

Presents Tour of Russian Industry



N. J. Grant, Massachusetts Institute of Technology, Reported on Highlights of a Trip Behind the Ferrous Boundary at a Meeting in Richmond in a Talk Entitled "A Metallurgical and Philosophical Tour of Russia". Shown are, from left: W. H. Ailor, treasurer; C. L. Brooks, education chairman; Dr. Grant; and J. A. Burke, Jr., vice-chairman of the Chapter

Speaker: N. J. Grant
Massachusetts Institute of Technology

"A Metallurgical and Philosophical Tour of Russia" was the subject of a talk in **Richmond** by N. J. Grant, department of metallurgy, Massachusetts Institute of Technology.

Highlights of a recent tour behind the ferrous boundary, in which the speaker was accompanied by John Chipman, past national president A.S.M., were reported. These men participated in a steelmaking conference where they presented technical papers as guests of the Russian Academy of Science.

Many technical, research and teaching institutes were visited, as well as industrial plants. The position of the scientist and engineer is very high in the Russian social structure. Even while in the technical or scientific school, the budding scientist or engineer is given a very liberal allowance or stipend. His education is a specialized one, where he is trained for a position in a narrow branch of ferrous or nonferrous metallurgy. He undertakes a five-year course, the last two years of which are highly specialized and often taken concurrent with research or production work in the facility where he will be assigned after graduation. Russia graduates about 4500 metallurgists a year, all of whom are guaranteed a job.

Under the Russian economic system, full-size plants can be used for experiments. This permits very fast movement in evaluating a promising process or technique. On the other hand, an atmosphere conducive to long-range research is maintained in the technical and educational institutes.

Dr. Grant used many color slides to illustrate his talk. In addition to those illustrating technical processes and educational facilities, a large number showing general scenery were presented.—**Reported by W. W. Berkey for Richmond.**

Receives Penn State's McFarland Award

Carl F. Hoffman of the Bethlehem Steel Co. (Right), Is Shown as He Received the McFarland Award Certificate From Harold J. Read, Chairman of the Award Committee, While Glenn Bush, Chairman of the Penn State Chapter, Looks on. Mr. Hoffman discussed "Modern Attacks on Iron Ores"

Speaker: Carl Hoffman
Bethlehem Steel Corp.

The tenth David Ford McFarland Award for achievement in metallurgy was presented to Carl Franklin Hoffman, Bethlehem Steel Co., by the **Penn State Chapter.** Mr. Hoffman presented a talk on "Modern Attacks on Iron Ores" and participated in a discussion led by Allen C. Gray, Editor of *Metal Progress.*

In discussing Mr. Hoffman's qualifications for the award, Harold J. Read, chairman of the awards committee, pointed to his technical accomplishments in the field of iron blast furnace operation and to his long tenure as superintendent of the blast furnace division of Bethlehem's steel plant at Sparrows Point, Md. Mr. Hoffman has been active not only in the affairs of technical societies in his field of specialization, but in church and community life as well.

In his technical address, Mr. Hoffman referred first to proposed methods of iron production which do not involve a blast furnace. He pointed out that they may have some applications in countries or locations where capital is limited or where juxtaposition of special ores and a suitable market justify a comparatively expensive reduction process. On the whole, however, he felt that the high efficiency of the blast furnace would make its replacement unlikely whereever the scale of production would justify its enormous capital cost.

Mr. Hoffman discussed nine specific avenues of attack for increasing the efficiency and productivity of the blast furnace and emphasized that research and development along these lines would help offset increasing construction costs.—**Reported by H. J. Read for Penn State.**

Metallurgical News and Developments

A Department of *Metals Review*, published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Devoted to News in the Metals Field of Special Interest to Students and Others

Add to Line—Hevi-Duty Electric Co. has announced the addition of fuel-fired heat treating, forging and melting furnaces to its line of electric heat treating furnaces through the acquisition of the furnace business of Eclipse Fuel Engineering Co., Rockford, Ill.

Oxygen Analyzer—A rapid, accurate and simple method for determination of oxygen in steel, titanium and other metals and alloys has been developed by the Laboratory Equipment Co. The method, which utilizes the Leco conductometric oxygen analyzer, is capable of producing complete analyses in 5 min., with an apparatus range of 0 to 0.35 on the basis of a 1g sample.

Bonding Process—A bonding process for joining aluminum and stainless steel has been announced by Aluminum Co. of America. The process, pressure bonding, makes possible the use of aluminum in combination with such metals as carbon and alloy steels, copper and other aluminum alloys.

Convention—The annual convention of the Societe Francaise de Metallurgie will be held from Oct. 20-25, 1958, in Paris. Interested American metallurgists are invited to attend. Information can be obtained from the Societe Francaise de Metallurgie, 25, rue de Clichy, Paris (9e), France.

New Quarters—The Joseph B. Kushner Electroplating School, Stroudsburg, Pa., has moved to new larger quarters in Evansville, Ind. (2509 Washington Ave.) The school trains men and women in the metal finishing industry with its well-known "Electroplating Know-How Course", by correspondence, and supplies texts on water and waste control for the plating shop and testing equipment.

Open Lab—The General Electric Co. has opened the $750,000 Applied Research and Development Laboratory of the Foundry Department to provide a vital link between pure research from which is developed new materials and processes, and the actual foundry use of such materials and methods as castings and improved production techniques.

Spectrometer—A mass spectrometer, particularly well adapted to the study of vapors at high temperatures, has been placed in service at Battelle Memorial Institute. The apparatus makes it possible to study vapors from solid or liquid specimens in an environment of 2000° C. or higher, and to obtain a high degree of resolution.

"I Spy"—An electronic device which uses nuclear energy to "peer" through hot walls of foundry furnaces to keep a constant automatic check on the level of the material inside has been developed by Nuclear Corp. of America. Called the Indicon I-100, the device projects gamma rays through the furnace to two Geiger counters, one mounted at the maximum fill level and the other at the minimum level. All components are outside the furnace so the instrument is safe from corrosion and mechanical damage. Its signal can be harnessed to actuate automatic furnace controls, or it can register on a control board hundreds of feet from the furnace.

Laminate—Laminol, a vinyl-to-metal laminate introduced by American Nickeloid Co., consists of solid vinyl film permanently fused by extreme heat and pressure to chemically treated steel and aluminum, combining the strength, rigidity and impact resistance of metal with the beauty, color and texture of the vinyl.

Opens Files—The U. S. Atomic Energy Commission has contracted with Stanford Research Institute to maintain a classified documents depository to serve the western states. The depository includes an initial collection of 7000 reports dealing with various aspects of nuclear energy research. Arrangements for use of the depository should be made through the Operations Office of the A.E.C., 518 17th St., Oakland, Calif.

Welding Conference—The fifth annual Midwest Welding Conference, sponsored by the Armour Research Foundation and the Chicago Section of the American Welding Society, will be held Jan. 28-29 on the Illinois Tech campus. Inquiries should be addressed to: Harry Schwartzbart, Supervisor of Welding Research, Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

New Alloy—Aluminium Ltd., 420 Lexington Ave., New York 17, N. Y., has introduced an extrusion ingot for structural applications called Alcan B51S which can be used for railings, decking, masts, standards and brackets, and many other structural uses. It offers higher extrusion speed, better mechanical properties and improved finish over aluminum alloys now in use.

Expanding—Metals Research and Development, Inc., Exeter, Pa., has announced that it is expanding its fabricating facilities by one-third. This involves the addition of a new pilot plant area where metal powder rolling facilities will be built and operated.

Metallurgy Courses — Metallurgists around the world can sharpen their metallurgical knowledge in many areas by means of home study. The A.S.M. Metals Engineering Institute now has courses in 16 subjects, ranging from elementary metallurgy for technicians to practical courses in the metallurgy of welding, foundry, special alloys for high-temperature or nuclear reactor construction. For detailed information, write to Metals Engineering Institute, 4601 Euclid Ave., Cleveland 3, Ohio.

Proceedings Available — A limited number of copies of the "Proceedings of the Sixth Annual Conference on Industrial Applications of X-Ray Analysis" are available from the Denver Research Institute. It contains 29 papers on X-ray diffraction, fluorescence, absorption, microscopy and instrumentation. Price $4.50. Write to: Proceedings, Denver Research Institute, University of Denver, Denver 10, Colo.

Indian Symposium — The National Metallurgical Laboratory of India is planning a symposium on "Iron and Steel Industry in India" in February 1959, and it is hoped that scientists and technologists of the entire world will participate, either by contributing papers concerning their specialty or by joining in the oral discussions. Any A.S.M. member who can contribute in absentia or who is planning on being in India in February is invited to write for further details to the Director, National Metallurgical Laboratory, Jamshedpur 7, India.

Outlines Tool Failure Causes—Cures

G. E. Sellers, Jr., Bethlehem Steel Co., Spoke on "Tool Failures—Their Causes and Cures" at a Meeting of the Jacksonville Chapter. Present were, from left: George A. Barker, Bethlehem district representative; B. W. Boisvert, chairman; J. H. Joyner, J. M. Tull Co.; and Mr. Sellers

Speaker: G. E. Sellers, Jr.
Bethlehem Steel Co.

George E. Sellers, Jr., contact metallurgist, Bethlehem Steel Co., talked on "Tool Failures—Their Causes and Cures" at a meeting held in **Jacksonville.** With the aid of slides he described and analyzed tool failures, adding that any toolmaker is faced with the problem of making a tool which will be both hard enough to stand up under the anticipated service and ductile enough not to crack in manufacture or in use. Since it is impossible to obtain maximum hardness and maximum ductility at the same time, some compromise is necessary.

Although most failures are traceable to faulty heat treatment practice, design faults often lead to failures of tools while undergoing treatment, or in service. Mr. Sellers listed the most common design faults as heavy sections adjacent to light sections and sharp corners. These faults mean trouble whenever a liquid-quenched grade of toolsteel is used, the variation in rate of cooling setting up stresses which often exceed the strength of the steel. When no change of design is possible, the only cure is the use of an air-hardening type of toolsteel. In any event, all sharp corners should be filleted.

Mr. Sellers listed several other design faults which can cause service failures, such as overloads and failure to provide proper tool clearances. He discussed proper grade application, basic heat treatment practices, good grinding practice, proper setup and use of tools, all very important factors contributing to successful toolmaking.—**Reported by Anthony Breda for Jacksonville.**

A. S. M. has produced and makes available for showing before chapters and educational institutions moving picture films pertaining to metals.

Compliments

To PAUL L. MCCULLOCH, JR., president of the Electro-Alloys Division, American Brake Shoe Co., who was elected president of the Alloy Casting Institute for the coming year. Mr. McCulloch is a member of the Cleveland Chapter.

♦ ♦ ♦

To OSCAR O. MILLER, International Nickel Co., Inc., on being elected president of the Technical Societies Council of New Jersey, Inc. A research metallurgist with INCO since 1950, Dr. Miller is supervisor of the steel section at the Research Laboratory in Bayonne, N. J. He is a member of the A.S.M.'s Transactions Committee.

♦ ♦ ♦

To A. M. AKSOY, manager of the Crucible Steel Co. of America's Applied Research Laboratory, who was invited by Russia to take part in a conference on vacuum applications in metallurgy sponsored by the USSR Institute of Metallurgy of the Academy of Science. Dr. Aksoy talked on "Quality Aspects and Properties of Vacuum Induction Melted and Vacuum Arc Remelted Steels and Superalloys".

♦ ♦ ♦

To HENRY M. HEYN, on his election as president of Surface Combustion Corp. and president of the Surface Industrial Division. Mr. Heyn was formerly vice-president and general manager of the Industrial Division. He is a long-time member of A.S.M.

♦ ♦ ♦

To EDGAR H. DIX, JR., assistant director of research, Aluminum Co. of America, on being awarded an Honorary Degree of Doctor of Science by Carnegie Institute of Technology, for his continuing contributions, particularly in the area of corrosion resistance, in the development of aircraft alloys. He is the author of nearly 100 publications on aluminum and nonferrous alloys.

To WILLIAM LOEHRER, a member of the Chicago Chapter and manager of alloy and stainless steel sales for Joseph T. Ryerson & Son, Inc., who had the distinction of making a hole-in-one while playing with a foursome at the annual golf outing of the Chicago Purchasing Agents Association.

♦ ♦ ♦

To A.S.M. members who received the following awards or distinctions from the American Society for Testing Materials: FRANK L. LAQUE, International Nickel Co., will continue as senior vice-president A.S.T.M.; A. ALLAN BATES, Portland Cement Association, nominated for vice-president; PAUL A. ARCHIBALD, Baldwin-Lima-Hamilton Corp., and WILLIAM L. FINK, Alcoa Research Laboratories, have been nominated for the Board of Directors; TRUMAN S. FULLER, metallurgical consultant, granted an honorary membership; and FRITZ V. LENEL, Rensselaer Polytechnic Institute, received the 1958 Award of Merit.

Manitoba Hears Talk on Metallurgy of Cast Iron

Speaker: M. D. Bleaken
Electro Metallurgical Co.

M. D. Bleaken, metallurgical engineer, Electro Metallurgical Co., Welland, Ont., spoke on the "Metallurgy of Cast Iron" at a meeting of the **Manitoba Chapter.**

Mr. Bleaken spoke on the effect of the chemistry on cast iron properties and illustrated the beneficial effects available with chromium, nickel, molybdenum and other alloys. He illustrated that irons of varying analyses may be related in mechanical properties through the comparison of the carbon equivalent of the metal. The phenomena of growth in gray iron and its control was outlined, as well as the modification of mechanical properties by inoculation procedures.

The history of nodular iron was traced with an explanation of the mechanical properties of as-cast, annealed and tempered nodular iron structures.—**Reported by J. E. Graver for Manitoba.**

Speaks on Truarc Rings

Speaker: J. C. Parry
Waldes Kohinoor Co.

John C. Parry, technical service engineer, Waldes Kohinoor Co., talked on the "Use of Truarc Rings" at a meeting of the **Manitoba Chapter.**

Mr. Parry illustrated various types of retaining rings and their applications in different industries. These uses included retaining piston wrist pins, locking gearhead assemblies, etc. Mr. Parry stated that each individual ring series is developed and engineered to meet specific fastening requirements and problems. New ring sizes and types are constantly being developed.—**Reported by J. E. Graver for Manitoba.**

Describes Electronic Industry Steels

William Jones, Manager, Electrical Steel Sales, Armco Steel Corp., Presented a Talk on "Electrical Steels for the Electronic Industry" at a Meeting of the Los Angeles Chapter. Shown are, from left: Mr. Jones; John Wilson, chairman; and Jonmore Dickason, immediate past chairman

Speaker: William Jones
Armco Steel Corp.

William Jones, manager, electrical steel sales, Armco Steel Corp., presented a talk on "Electrical Steels for the Electronic Industry" at a meeting of the **Los Angeles Chapter.**

Mr. Jones reviewed the silicon alloy steels used in modern electrical and electronic apparatus. Such steels, although produced in large annual tonages, are used by only a relatively few specialized companies, and many metallurgists have little knowledge of the intricacies of these highly specialized alloys.

Silicon alloy steels are almost entirely flat rolled sheets and strip in thicknesses from 0.025 down to 0.000125 in. Silicon content varies significantly between 0.5 and 5%. General classes covered were: hot rolled silicon sheets and butt-welded coils, both fully and semiprocessed; cold rolled sheets and coils, both fully processed and semiprocessed; grain oriented silicon sheet coils; thin-gage silicon steel coils, both oriented and nonoriented; and ultra-thin silicon steel coils.

Typical applications were outlined, from huge power and distribution transformers down through such applications as refrigerator and washing machine motors, to highly efficient but tiny aircraft and missile motors, to ultra-tiny memory cores used in modern computors. From the turbine-driven generators of Boulder Dam down to the armature motors in electric razors, all depend on high-quality electrical steel for their operation.

These steels are precisely rolled and even more carefully heat treated to bring out the very lowest core loss and highest permeability. The basic silicon-iron alloy must have magnetic efficiency far above that provided by ordinary low-carbon steels. The core of a transformer or the rotors or stators of rotating electrical equipment must take maximum advantage of the available magnetic flux. To do this, two factors are required: low core loss and/or high permeability. Core loss is expressed as watts per pound and represents the loss in energy due to the alternating magnetization of the steel. Permeability is that property of a silicon steel which enables it to provide greatest ease and maximum capacity for magnetic flux travel.

Some steels require low core loss in both lengthwise and crosswise directions. Others, for special applications like wound transformer cores, require excellent low core loss in a lengthwise direction (direction of rolling with only scant attention paid to crosswise properties). Such steels are the grain-oriented or "cube-on-edge" type.

An interesting description of current experimental work on the cubic type of grain orientation was given. Such material, when perfected, will show excellent magnetic properties in longitudinal as well as transverse directions. Commercial production of cubic oriented electrical steel is not likely for several years.

This very interesting meeting was concluded with a question and answer session in which many other points were brought out and explained by the speaker.—**Reported by Graham Hall for Los Angeles.**

Milwaukee Is Host to Metallurgy Students

Twenty-Six Students From the Metallurgy Departments of the University of Wisconsin, Marquette University and the Milwaukee School of Engineering Were Guests of the Milwaukee Chapter During the Annual Students Night Meeting. A $400 A.S.M. scholarship was presented to Leroy E. Abrahamson (seated, center), University of Wisconsin sophomore. W. L. Grube, General Motors Research Staff, presented a talk on "Electron Metallography" during the technical portion of the meeting. (Reported by J. Sullivan)

Talks on Metal Strengthening

"Fine Particle Strengthening of Metals" Was Discussed by N. J. Grant (Left), Massachusetts Institute of Technology, at a Meeting Held in Washington. He is shown with H. Stauss, Chapter chairman

Talks on Failure Analysis

Alfred Bornemann, Chairman of the Department of Metallurgy, Stevens Institute of Technology, Presented a Talk on "Failure Analysis of Metals" at a Meeting of New Haven. Shown are, from left: Harold O. Seeley, chairman; Dr. Bornemann; and M. J. Weldon, the technical chairman. (Reported by James L. Baker)

Speaker: N. J. Grant

Massachusetts Institute of Technology

N. J. Grant, Massachusetts Institute of Technology, presented a talk on "Fine Particle Strengthening of Metals" at a meeting in Washington.

The first system described by Dr. Grant was the well-known Swiss sintered aluminum powder (SAP) and its American counterpart, M-257. Fine aluminum powder particles have a natural thin oxide film and on pressing, sintering and working, a strong material which retains its strength up to temperatures much higher than other aluminum products is obtained.

Micro-examination shows that the finely distributed oxide prevents recrystallization at elevated temperatures and it is found that there is a uniform distribution of thin oxide flakes in the material. Ductility is adequate even in the transverse direction but the material tends to be notch sensitive. The development of this remarkable system has encouraged metallurgists to examine other combinations of metals and oxides but it is found that the oxide must be insoluble and refractory. Aluminum oxide is apparently one of the best and has improved high-temperature strength in pure metals such as copper and nickel. Cerium oxide is also being examined.

The finer the original metal power and oxide powder and the better the mixing, the greater the strength of the final worked material.

The systems nickel-aluminum oxide and copper-aluminum oxide were described and the effect of particle size was shown to be of paramount importance. In this connection sources of fine metal powders were difficult to find because the usual commercial supplies were not only somewhat impure but of inadequate fineness. Copper powder was mixed with 10% of 0.02 micron aluminum oxide, pressed, sintered and extruded. It was then subjected to various temperatures but it was not until a source of 1 micron copper powder was discovered that the remarkable result of stability of grain size at 1000° C. for 100 hr. was obtained with a 10% admixture of 0.02 micron aluminum oxide.

Mechanical mixing of the fine metal and oxide powders is an unsatisfactory method of obtaining really uniform distribution of the oxide because the metal or oxide tends to ball up and form segregated areas and these allow weakness and grain growth to develop. For this reason attempts have been made to alloy metals with more oxidizable metals. The base metal must dissolve oxygen at the sintering temperature so that it can diffuse into the material and oxidize the atoms of the more oxidizable metal.

Nickel with 0.5% aluminum can be internally oxidized and then gives a structure which has strength and stability of grain size up to 1500° F., while silver alloyed with 2% nickel and 0.5% magnesium will give up to 58,000 psi. yield after exposure to 700° F.

Many new systems are being examined and among these, perhaps, the use of more refractory oxides, borides, carbides, such at ThO_2, CeO_2, ZrO_2, etc., in high-temperature metals will prove a great future potential in the high-temperature field. — Reported by R. C. Tucker for Washington Chapter.

President Guest at West Michigan

National President G. M. Young, Aluminum Co. of Canada, Ltd., Presented a Talk on the "Extrusion Process" at a Meeting in West Michigan. During the meeting Jon A. Hussey, sophomore in metallurgical engineering at Michigan State University was awarded a scholarship by the Chapter. Shown are, from left: Mr. Young; Austen J. Smith, Michigan State University; Mr. Hussey; and L. Russell McLaughlin, chairman of the Chapter

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared at the Center for Documentation and Communication Research,
Western Reserve University, Cleveland.
With the Cooperation of the John Crerar Library, Chicago.

General Metallurgy

445-A. Health and Safety in Foundries. George Barnett. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 17-30.

Foundry hazards caused by dust and fumes. Other types of injuries and preventive measures. 51 ref. (A7p, E-general)

446-A.* New Commutator Alloy Takes the Heat. Webster Hodge. *Iron Age,* v. 182, July 10, 1958, p. 102-103.

Designed especially for use in small electric motors and alternators, this special Zr-Cu alloy can retain its strength at high temperatures. (A-general; Q-general, T1, 17-57; Zr, Cu)

447-A. The Future of Titanium. Tom Margerison. *New Scientist,* v. 4, June 12, 1958, p. 156-158.

Prospects are excellent due to excellent corrosion resistance and an eventual reduction in costs which will result from increased volume of production. (A-general; Ti)

448-A. New Developments in Steelmaking in Europe. D. L. McBride. *Society of Automotive Engineers, Preprint* 30C, Mar. 1958, 9 p.

13 ref. (A-general, D-general; ST)

449-A. Some Aspects of Handling Mercury. J. G. S. Biram. *Vacuum,* v. 5, Oct. 1955, p. 77-91.

47 ref. (A7; Hg)

450-A. The Economics of Heat and Power Utilization of Energy in a Mixed Iron Works as Affected by Technical Developments. Hans Weineck. *Stahl und Eisen,* v. 77, July 25, 1957, p. 988-998. (Iron and Steel Institute Translation no. 661.)

Previously abstracted from original. See item 379-A, 1957.
(A11e, D-general; Fe, ST)

451-A. The Utilization of Energy in a Mixed Iron Works. Fritz Stolzenberg and Hermann Tiemayer. *Stahl und Eisen,* v. 77, July 25, 1957, p. 998-1006. (Iron and Steel Institute Translation no. 662.)

Previously abstracted from original. See item 380-A, 1957.
(A11e, W10; ST)

452-A. (Japanese.) **Present State of Heat Resistant Alloys. Pt. 4.** T. Mitsubashi and T. Ita. *Metals,* v. 28, June 1958, p. 459-463.

(A-general; SGA-h)

453-A. (Japanese.) **Progress and Present State of Soviet Iron and Steel Industry.** T. Aoki. *Metals,* v. 28, June 1958, p. 466-471.

(A4, D-general; ST)

454-A.* Low-Cost Cryogenic Steel Goes Commercial. J. Procter. *Chemical Engineering,* v. 65, July 14, 1958, p. 160-164.

New 9% Ni alloy has high tensile and yield strength at low temperatures (to −350° F.).
(A-general; SS, Ni, 2-63)

455-A.* Gray Iron Has Unique Wear-Resistant Properties. Joseph R. Diear. *Foundry,* v. 86, Aug. 1958, p. 62-63.

Amount and structure of graphite on iron has a strong influence on boundary lubrication properties. Proper graphite structure prevents galling and welding during time of metal-to-metal contact.
(A-general; CI-n)

456-A.* Modifications to the Fontana Open Hearth Precipitators. Earl V. Akerlow. *Iron and Steel Engineer,* v. 35, July 1958, p. 97-103.

Dry electrostatic precipitators at Kaiser Steel Corp., Oakland, Calif., employ saturable reactor control with selenium rectifier transformers as well as conventional mechanical rectifier equipment, special collecting and discharging electrodes, specially designed rapping equipment and gas distribution apparatus. (A8a, W13c)

457-A.* Safeguarding Steel Production. R. M. L. Russell. *Iron and Steel Engineer,* v. 35, July 1958, p. 112-123.

"Hot spots" in steel mills; prevention, control and extinguishing of fires; carbon dioxide systems, automatic sprinkler systems. (A7)

458-A.* The Growing Canadian Steel Industry. D. S. Holbrook. *Iron and Steel Engineer,* v. 35, July 1958, p. 133-136.

Canadian government's tax policy on depreciation stimulates expansion and efficient practice.
(A-general; ST)

459-A.* Strength Skyrockets in Formable Titanium. *Machine Design,* v. 30, July 10, 1958, p. 12, 14.

Three new solution treated anneal Ti alloys have extremely high strength-weight ratio, excellent corrosion resistance.
(A-general; Ti, Al, Mo, V)

The subject coding at the end of the annotations refers to the revised edition of the ASM-SLA Metallurgical Literature Classification. The revision is currently being completed by the A.S.M. Committee on Literature Classification, and will be published in full within the next few months.

460-A.* (German.) Recent Developments in Whiteheart, Blackheart and Pearlitic Malleable Cast Iron. A. Hohmann. *Giesserei-Praxis,* v. 76, Apr. 10, 1958, p. 117-119.

German standards GTW 35, GTW 40, GTS 35 and GTS 40, as well as U. S. standard and pearlitic malleable cast irons discussed; processing; properties. Tempering in Cr-Ni steel container advised, proper ratio of pig and scrap in percent. Emphasizes improved properties through induction hardening, gives scheme of suitable equipment with data of current and temperatures. New aspects in production through growing use pointed out.
(A-general, S22; CI-s)

461-A.* (German.) "Erftal", a High Gloss Mill Aluminum. H. Ginsberg, R. Lattey and H. Neunzig. *Metall,* v. 12, June 1958, p. 497-501.

Aluminum (99.9% Al, < 0.04% Fe), can be brought to a high gloss finish through repeated annealing. Through the annealing the remaining impurities are kept in solution and are equally distributed. An addition of chromium acid to the finishing bath increased the reflecting properties. This process is particularly advantageous for consumer goods. Tables of composition, micrographs and reflection properties in relation to heat treatment.
(A-general, J23a; Al-a)

462-A. How to Set Production Standards for Pouring, Shifting and Shakeout. J. E. Keith. *Foundry,* v. 86, July 1958, p. 85-89.

(A5d, E-general)

463-A.* Investment Casting Directory. Section 1. Technical Section. *Precision Metal Molding,* v. 16, June 1958, p. 58-61.

Data on composition of ferrous and nonferrous alloys commonly investment cast; mechanical properties of alloys in the as-cast and hardened conditions; includes aluminum, copper, nickel, cobalt, and magnesium-base alloys, carbon, low alloy, stainless and special steels.
(A-general, E15)

464-A. Progress in Research in Iron and Steel Usage. *Sheet Metal Industries,* v. 35, July 1958, p. 543-547, 551.

Survey of the Annual Report of the British Iron and Steel Research Association for 1957. Topics covered include cold rolling, sheet and strip processing, tinplate manufacture, plastic-coated steel, structural engineering steels, corrosion and high-temperature steels.
(A-general; ST)

465-A.* Iron-Aluminum Base Alloys. Cheap Stainlesses of the Future. Blake King, J. J. Mueller, N. N. Ida and F. G. Tate. *Society*

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

of Automotive Engineers, Preprint 60B, 1958, 20 p.

Experimental alloys prepared by the Martin Co., compare favorably in strength and ductility at both high and low temperatures with the ferritic stainless steels. 9 ref. (A-general; Al, Fe)

466-A. Hypereutectic Aluminum-Silicon Alloys. Richard M. Smith. *Society for Automotive Engineers, Preprint 65A*, 1958, 8 p.

Evaluation of foundry characteristics, physical and mechanical properties, corrosion resistance. (A-general; Al, Si)

467-A.* Workhorses of the Industry: PH Stainless Steels. J. N. Barnett and W. W. Rohde. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 6-9.

Composition and properties of 17-7 PH, 17-4 PH and 15-7 PH stainless steels. (A-general; SS)

468-A.* Metal Strengths at High Temperatures. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 10-11.

Table giving Himatic tensile strength, yield strength, elongation and modulus of elasticity for several Al, Mg, Ti, Ni and Co alloys from room temperature to 1000° F. (A-general, 2-62)

469-A.* "Exotic" Metals. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 10-11.

Table giving mechanical properties of Be, Ti, Mo, Ta, V, 25TiV, W from room temperature to 4000° F. (A-general, 2-62)

470-A.* Average Properties of Structural Carbon and Graphite. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 12.

Table showing commercial designation, available sizes and properties. (A-general; RM-h39)

471-A.* New Hardenable Titanium. Robert W. Carson. *Product Engineering*, v. 29, July 21, 1958, p. 68-69.

Age-hardening alloy combines high strength (up to 240,000 psi.), corrosion resistance of pure Ti, service temperatures of 600 to 800° F. and the highest strength-weight ratios available. (A-general; Ti)

472-A.* New Super Alloy Bids for Hot Jobs. F. Kenneth Iverson and M. A. Pohlman. *Product Engineering*, v. 29, July 21, 1958, p. 76-77.

New high-temperature Ni superalloy, Rene 41, has improved stress-rupture strength, good ductility and formability, low distortion, good weldability, corrosion resistance. (A-general, Q-general; Ni, SGA-h)

473-A. (Russian.) **How to Make Effective Use of Metal Shavings.** I. N. Goncharov, I. A. Azarov and Yu. G. Dorofeev. *Vestnik Machinostroeniya*, v. 38, June 1958, p. 46-49.

Shavings are pressed into briquettes in a specially built furnace under hammer pressure. Machine parts made from these briquettes were three times stronger than those made from original steel. (A11d; ST)

474-A. Pulsometer-Tett Water-Treatment Processes. *Corrosion Technology*, v. 5, July 1958, p. 225-226.

Chemical reagents are added to correct overhardness, softness, acidity or alkalinity and to form a flocculent precipitation on the surface of the filtering medium to trap over 95% of the bacteria and other matter in suspension minute enough to pass through the filtering medium. (A8b, NMa-38)

475-A. U_3O_8 Production Now Under Way at Ambrosia Lake District. John B. Huttl. *Engineering and Mining Journal*, v. 159, July 1958, p. 86-92.

(A11a, B12p; U)

476-A. Safety Saves Money at Albion Malleable Iron Co. Jack C. Miske. *Foundry*, v. 86, Aug. 1958, p. 54-57.

(A7p, E-general)

477-A. System Prevents Waste Buildup in Central Coolant Supply. A. B. Myler. *Iron Age*, v. 182, July 31, 1958, p. 56-57.

Automatic continuous removal of fine metal particles from coolant is accomplished by two flotation cells, in which the fines are trapped in a froth of aerated oil and skimmed off. (A8b, A11d)

478-A. Three-Point Plan Reduces Scrap Handling. *Iron and Steel Engineer*, v. 35, June 1958, p. 141-143.

(A5a; RM-p)

479-A. Proizvodstvo Sovetskogo Soyuza (Made in Russia). *Reynolds Review*, v. 18, July-Aug. 1958, p. 2-8.

Russian Al industry. (A4; Al)

480-A. Chemistry and Metallurgy of Titanium Production. J. J. Gray and A. Carter. *Royal Institute of Chemistry, Lectures, Monographs and Reports*, no. 1, 1958, 56 p.

Titanium ore reduction, isolation, analysis, extraction processes, melting practice, ingot processing, physical and mechanical properties. 99 ref. (A-general; Ti)

481-A. (German.) **St 52 With Vanadium and Titanium Additions.** St. Kronmarck. *Technik*, Jan. 1958, p. 19-28.

14 ref. (A-general; AY, *Ti, V*)

482-A. (German.) **Ferromagnetic Materials and Their Application.** G. Sommerkorn and H. Staeblein. *Elektro-Anzeiger*, no. 7, Feb. 12, 1958, p. 47-51.

(A-general, 17-57; SGA-n)

483-A. (German.) **Historical Development of the Electric-Arc Furnace for Steel Plants.** L. Arends. *Elektrowaerme*, Oct. 1957, p. 345-354.

6 ref. (A2, W18s; ST)

484-A. (German.) **Nodular Cast Iron.** K. Kessler. *Industrie-Anzeiger*, no. 35, May 2, 1958, p. 26-27.

(A-general; CI-r)

485-A. (German.) **Sewer Water Treatment in the Metal Industry.** B. Wedekind. *Metall*, v. 12, June 1958, p. 515-519.

18 ref. (A8b)

486-A. (German.) **Uranium-Iron Alloys.** Th. Geiger and C. Fizzotti. *Schweizer Archiv*, Jan. 1958, p. 27-32.

8 ref. (A-general; U, Fe)

487-A. (German.) **Health Hazards Caused by Bessemer Slag, Vanadium Slag, and Vanadium Compounds.** Walter Reinl. *Staub*, v. 18, May 1, 1958, p. 143-148.

37 ref. (A7; RM-q, V)

488-A. (German.) **Possibility of a Connection Between "Dreckapotheke" and Hardening Agent for Steel.** Ernst-Hermann Schulz. *Sudhoff's Archiv für Geschichte der Medizin und der Naturwissenschaften*, v. 42, Mar. 1958, p. 62-64.

"Dreckapotheke", blood, urine and excrements of men and animals, as hardening agents for steel according to recipe-books of the Middle Ages. (A2, J28; ST)

489-A. (German.) **Titanium Alloys.** W. Hess. *Technica*, no. 23, Nov. 8, 1958, p. 1311-1313.

(A-general; Ti-b)

490-A. (German.) **Nodular Cast Iron—a New Structural Material.** A. Wittmoser. *VDI-Berichte*, v. 27, 1958, p. 5.

(A-general; CI-r)

491-A. (Italian.) **The Italian Origin of the Hydroelectric Trompe.** Bruno Boni. *Fonderia Italiana*, v. 7, May 1958, p. 161-168.

(A2, D-general; ST)

492-A.* The New Precipitation-Hardening Stainless Steels for Super-Sonic Craft. Allen C. Gilbraith. *Australian Machinery and Production Engineering*, v. 11, May 1958, p. 23-31.

Properties and applications of 17-7 PH, 17-4 PH, NM 350 stainless steels after various heat treatments. (A-general; SS)

493-A.* Crucible Steel Introduces Three New Heat-Treatable Titanium Alloys. *Industrial Laboratories*, Aug. 1958, p. 30-31.

New beta alloy B-120VCA (13V-11Cr-3Al) has the highest strength and best formability of any Ti-base material. Data also for C-105VA (alpha-beta type containing nominally 16% V and 2.5% Al); and C-115 A Mo V. (A-general, J-general: Ti-b)

494-A. Magnesium. L. Sanderson. *Canadian Mining Journal*, v. 79, June 1958, p. 102-103.

Properties, metallurgy and uses. (A-general; Mg)

495-A. Above 2,500° F., What Material to Use? Luther D. Loch. *Chemical Engineering*, v. 65, June 30, 1958, p. 105-109.

New developments in theory and applications of high-temperature processing presage broader uses for super refractories. (A-general, Q-general; SGA-h)

496-A. The Metal That Changed Canada. *Electrical News and Engineering*, v. 67, June 1958, p. 115-117.

Influence of Al on industrial development of Canada. (A-general; Al)

497-A. What Does the Future Hold for Numerical Controls? G. S. Knopf. *Iron Age*, v. 182, July 24, 1958, p. 77-80.

(A5, 18-74)

498-A. Old Ironworks in Belgium and Luxemburg. R. W. Allott. *Iron and Coal Trades Review*, v. 176, June 13, 1958, p. 1437-1438.

(A2; Fe)

499-A. Fifty Years of Metallurgical Science. A. G. Quarrell. *Journal of the Institute of Metals*, v. 86, July 1958, p. 475-484.

Historical review with emphasis on atomic studies, alloy development, various metallurgical phenomena. 32 ref. (A2; 10-54)

500-A. Heavy Metal Solves Weighty Problems. Annesta R. Gardner. *Product Engineering*, v. 29, July 21, 1958, p. 62-64.

Heavy metals, a group of high-density, 90% tungsten alloys, are finding increased use as counterweights, rotating elements and radiation shields. High density and adequate machinability available. (A-general; W-b)

501-A. (English.) **Present Status and Future of the Titanium Industry in the U. S.** Herbert H. Kellogg. *Schweizer Archiv*, v. 24, Jan. 1958, p. 14-20.

(A4p; Ti-b)

502-A. (French.) **French Foundry Industry.** Réne Lebeau. *Métallurgie et la Construction Mécanique*, v. 90, June 1958, p. 467-470.

Importance and classification of castings according to special uses; diversity of founding activity; exports. (A4p, E-general)

503-A. (German.) **Diseases Caused by Thomas Slag, Vanadium Slag and Its**

Compounds. Walter Reinl. *Staub*, v. 18, June 1, 1958, p. 177-181.

42 ref. (A7n; Rm-q)

504-A. (Russian.) Automation Progress in Ferrous Metallurgy. A. K. Adabash'yav. *Metallurg*, v. 3, May 1958, p. 1-3.

Output of blast and openhearths doubled since 1940 as result of automation. Plans for 1958-1965—to advance from automation of specific processes to fully automated plants in all fields of metallurgy. (A-general, D1, D2, 18-74)

505-A.* How to Treat and Fabricate Beryllium Copper. *Metalworking Production*, v. 102, July 25, 1958, p. 1311-1315.

Summary of fabrication techniques, annealing and pickling and joining methods for Mallory 73 Be-Cu strip. (A-general; Cu, Be)

506-A.* Report on the Engineering Properties of Commercial Titanium Alloys. M. W. Mote, R. B. Hooper and P. D. Frost. Battelle Memorial Institute, Titanium Metallurgical Laboratory, TML Report no. 92, June 4, 1958, 56 p.

Extensive analysis of the effect of alloy components in Ti; available commercial Ti mill products; mechanical properties; fabrication characteristics; promising new alloys, data on specific alloys. (A-general, T-general, Q-general; Ti-B)

507-A.* Vascojet 1000 Provides High Strength Over Wide Temperature Ranges. John C. Hamaker, Jr. *SAE Journal*, v. 66, July 1958, p. 68-73.

Utilizing an entirely new heat-treating concept for structural materials, a 5% Cr steel, VascoJet 1000, demonstrates outstanding advantages for high-strength parts operating at temperatures between −100 and 1000° F. (A-general; SS, Cr)

508-A.* (Russian.) Influence of Alloying Elements on Properties of Chromium-Nickel-Molybdenum-Copper Steel. E. V. Zotova. *Stal'*, June 1958, p. 550-556.

Investigation of several grades of Cr-Ni-Mo-Cu steel with varying content of these elements to determine grades of steel suitable for welded structures and cast machine parts which are stable in hot solutions of sulphuric acid. Recommend steel with content of 8-23% Cr, 18-20% Ni, 3% Mo and 3% Cu. 9 ref. (A-general; SS, Cr, Cu, Ni, Mo)

509-A. Development of Wrought Aluminum-Magnesium Alloys. E. H. Dix, Jr., W. A. Anderson and M. Byron Shumaker. *Aluminum Co. of America, Technical Paper no. 14*, 1958, p. 1-63.

Report of two new Al-Mg alloys, one a high-strength nonheat-treatable alloy, the other suitable for high-temperature use. (A-general; Al-b, Mg-b)

510-A. Copper and Its Alloys—Pt. 3. Nickel and Silver. E. Voce. *Copper*, no. 3, Summer 1958, p. 17-20.

Composition and properties of wrought Ni-Ag and Ni brasses. (A-general; Cu-b, Cu-n, Ni, Ag)

511-A. (German and French.) History of the Arc Welding Electrode. F. Wörtmann. *Zeitschrift für Schweisstechnik*, v. 47, Nov. 1957, p. 279-287.

(Concluded.) (A2, W29h)

512-A. (Russian.) Perspectives for Development of Iron and Steel Industry in the Georgian SSR. N. G. Gomelauri. *Stal'*, June 1958, p. 486-488.

(A-general; ST)

513-A. (Pamphlet.) Recommended Safe Practices for Inert-Gas Metal Arc Welding. 9 p., 1958. American Welding Society, 33 W. 39th St., New York 18, N. Y. $1.

Potential hazards peculiar to inert-gas metal-arc process; recommendations for controls. 5 ref. (A7p, K1)

514-A.* (Pamphlet.) The Supply of Nickel—1958-1961. May 1958, 12 p. International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Present and future production capacity; available stocks; consumption in North America and the free world. (A4, A11a; Ni)

515-A. (Book.) Engineering Materials. 607 p. 1958. Pittman Publishing Corp., 2 W. 45th St., New York 3, N. Y. $8.50.

Background information on construction and other engineering materials, their production and principal properties. One-third of text is devoted to metals, covering structure and constitution of metals and alloys, manufacture, shaping, properties, uses, etc., of cast iron, steel, wrought iron, malleable cast iron, nonferrous metals and alloys, corrosion and anti-corrosion protection, testing of materials. (A-general)

B Ore and Raw Material Preparation

172-B. Ore Dressing Developments in Australia. Pt. 2. Filtration and Thickening; Gold Ore Treatment; Coal Preparation; Treatment of a Wolfram-Cassiterite Product; Beach Sands; Uranium; Research. H. H. Dunkin. *Chemical Engineering and Mining Review*, v. 50, Apr. 15, 1958, p. 40-49.

32 ref. (B13, B14)

173-B. Mineral Dressing. Norman Weiss. *Mining Congress Journal*, v. 44, Feb. 1958, p. 70-74.

Physical processes are being replaced with wet and dry processes involving chemical-physical change. Review of papers at International Mineral Dressing Congress in 1957, Stockholm, Sweden. (B13, B14, B16; Fe, U)

174-B. Hydrometallurgical Processes at High Pressures. F. A. Forward and J. Halpern. *Journal of Applied Chemistry of the USSR*, v. 30, (1957), p. 1-20. (Translation by Consultants Bureau, Inc.)

103 ref. (B14, 3-74)

175-B. Problems in Sinter Production. L. I. Kharash. *Stal'*, v. 17, no. 2, 1957, p. 106-114. (Iron and Steel Institute Translation no. 761.)

Previously abstracted from original. See item 129-B, 1957. (B16a; Fe)

176-B.* (Japanese.) A Method of Testing the Endurability of Refractory Brick. Shoji Tomita. *Japan Foundrymen's Society*, v. 30, May 1958, p. 418-426.

Endurance of cupola brick is closely related to its resistance to slag erosion; spalling resistance has a considerable effect on its endurance; endurance of the brick is highly dependent upon the heating temperature in the cupola; Agalmatolite brick, under the proper conditions, has highest endurance as cupola brick. (B19d, W18d)

177-B. (English.) New Aluminum-Bearing Minerals in Bauxites. S. I. Beneslavsky. *Academy of Sciences of the USSR, Proceedings*, v. 113, 1957, p. 367-369.

Aluminum is found in the composition of some minerals of iron oxide and hydroxide, which are the chief components of the nonsoluble residues of bauxite. (B-general; Al)

178-B* (German.) Contribution to the Study of Flotation Kinetics. I. Huber Panu. *Revue de Métallurgie (Bucarest)*, v. 1, 1956, p. 112-120.

New flotation kinetics formulas express the variation of the extraction of the useful substance and of the flotation velocity as a function of time, the formulas taking into account the actual conditions under which the flotation is effected. 3 ref. (B14h)

179-B.* (German.) Chemical Reactions of Sulphur in Coal During the Coking Process. An Investigation With the Help of Radioactive Isotope S^{35}. Hanns Jurgen Reintjes. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 283-291.

S^{35} added to coal in the form of calcium sulphate and pyrite, and the distribution of sulphur in coal among the degassing products was studied. Reactions of pyrites and sulphates were measured directly while the organic sulphur was determined through different calculations. Tables show sulphur distribution activity measurements and their evaluation. Testing apparatus. (B17g, 1-59; *S*)

180-B. (German.) Application of Radioactive Isotopes in the Examination of the Flotation Process. I. N. Plakssin. *Freiberger Forschungshefte*, no. A59, Dec. 1957, p. 5-44.

Radiometric and microradiographic methods. 24 ref. (B14h, 1-59)

181-B. (German.) Theoretical Tests of the Flotation Process. O. S. Bogdanow. *Freiberger Forschungshefte*, no. A59, Dec. 1957, p. 45-74.

(B14h)

182-B.* (German.) Concentration of Zinc Ore in the Freiberg Area. Johannes Lohn. *Neue Hütte*, v. 3, Apr. 1958, p. 203-213.

Tests were carried out to determine the possibilities of separating Cu_2FeSNS_1 from accompanying ores, in particular lead and zinc concentrates. Only the selective flotation method proved satisfactory. Through bubble adherence tests the flotation properties were determined. As regulating agent $Na_2S_2O_5$ and Na_2S with high pH values were found to be most successful. 12 ref. (B14h; Zn, Pb)

183-B. (German.) Refractory Problems on Remelting Furnaces. Eduard Eipeltauer. *Neue Hütte*, v. 3, May 1958, p. 303-304.

Considerable difficulties were encountered during remelting of Zn cathode plates in low-frequency furnaces. Refractories were destroyed by the beating of the Zn bath and by frequent small explosions. Suitable refractories and burning temperature recommended. (B19c, W18; Zn)

184-B.* (Japanese.) Concentration of Tin Ore Containing Lead and Zinc. Tsunemasa Imaizumi, Masao Suzuki and Saburo Iwata. *Engineering Research Institute of Tokyo University, Annual Report*, v. 16, Mar. 1958, p. 60-66.

Tin ore from Mitake mine contains Pb and Zn as highly oxidized minerals. Separation of Pb minerals from cassiterite by flotation after tabling was successful. From tabling tests cerussite and cassiterite are to be recovered as combined concentrate, and both hemimorphite and limonite as middlings and tailing. (B14; Pb, Sn, Zn)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

185-B.* A Basic Insulating Refractory. Henry M. Harris and Hal J. Kelly. *American Ceramic Society Bulletin*, v. 37, July 1958, p. 307-311.

High-porosity, low-density basic refractories were made by a casting method in which porosity was produced by the action of phosphoric acid and ammonium lignin sulphonate on MgO. 5 ref.
(B19; RMh-38)

186-B. (French.) Ore Dressing in Luxemburg. J. Paquet. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 121-124.

Coke rate, iron production, power balance, costs for sintering.
(B13, B14, B16a)

187-B. (German.) Flotation of Tin Pyrites and Separation From a Lead-Zinc Ore. Johannes Löhn. *Bergakademie*, v. 10, Apr. 1958, p. 259.

(B14h; Pb, Sn, Zn)

188-B. Treatment of Table Feed From Wattle Gully Gold Mines, Chewton, Vic. J. T. Woodcock. *Australian Scientific and Industrial Research, University of Melbourne, Ore-Dressing Investigations, Report no. 543*, Sept. 1957, 16 p.

Direct tabling recovered 62% of the Au in a concentrate assaying 45 dwt/ton. (B14; Au)

189-B. High-Tension Separation of Salt Coated Beach Sands From Kilcare, N.S.W. S. B. Hudson. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 549*, Nov. 1957, 5 p.

Sizing tests on concentrates of ilmenite, rutile and zircon.
(B14; Ti, Zr)

190-B. Concentration of Beach Sand Minerals From Fraser River Area, King Island, Tasmania. S. B. Hudson. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 550*, Dec. 1957, 11 p.

Determination of recoverable rutile and zircon and treatment required to clean the mineral grains to obtain these concentrates.
(B14; Ti, Zr)

191-B. Treatment of Beach Sands From Strahan, Tasmania. S. B. Hudson. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 551*, Dec. 1957, 11 p.

Concentrates prepared from each sample contained about 8% recoverable rutile, 14% zircon, 17% ilmenite and not less than 21% chromite.
(B14; Ti, Zr, Cr)

192-B. (Book.) Dispersion of Materials. Rolt Hammond. 230 p. 1958. Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. $10.

Chapters on crushing and grinding, fluidization, flotation, liquid dispersions, atmospheric pollution.
(B13, B14, B15, A8b)

193-B. (Book.) Separation and Purification of Materials. Rolt Hammond. 327 p. 1958. Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. $10.

Solid-solid, solid-liquid, solid-gas, liquid-liquid, liquid-gas and gas-gas systems with a chapter on separation and purification in nuclear engineering.
(B14, C19, C28, A8a)

Extraction and Refining

229-C. Atomic-Age Metal Extraction. L. W. Coffer. *Chemical Engineering*, v. 65, Jan. 27, 1958, p. 107-122.

Chemical engineering techniques, much ignored in metal production, now solve tough corrosion, erosion, high-temperature problems in a host of new processes for making "difficult" metals. 34 ref.
(C19, C-general, D-general)

230-C. Continuous Casting of Large Tough Pitch Copper Slabs. *Engineer*, v. 205, June 6, 1958, p. 869, 871.

"Asarco" process eliminates batch casting in costly individual metal molds by use of a small "bottomless" water-cooled graphite mold.
(C5q; Cu)

231-C. Processing Solution and Results—Guides to Your Mineral Problem. *Engineering and Mining Journal*, v. 159, Mid-June 1958, p. 65-96.

Thirty-one pages of flowsheets showing how metals are processed from their ores.
(C-general, B-general)

232-C. Recovery of Gold, Silver and Nickel From Alkaline Cyanide Solutions by Means of Weak-Base Ion-Exchange Resins. J. Aveston, D. A. Everest, N. F. Kember and R. A. Wells. *Journal of Applied Chemistry*, v. 8, Feb. 1958, p. 77-86.

(C19s; Ag, Au, Ni)

233-C. A Casting Technology for Reactive Metals. F. W. Wood, S. L. Ausmus and E. D. Calvert. *Modern Castings*, v. 34, July 1958, p. 80-86.

Equipment and practices employed in consumable-electrode, cold mold arc casting. Some cast products are illustrated and their quality discussed. Major areas of potential process improvement. 8 ref.
(C5h, 1-52; Ti, Zr)

234-C. Electrolytic Separation Studies of Nickel and Cobalt From Nicaro Plant Products. M. J. Ferrante, P. C. Good and P. M. Gruzensky. *U. S. Bureau of Mines, Report of Investigations 5394*. May 1958, 30 p.

Electrolytic process for recovering specification-grade Ni from either Nicaro (Cuba) pregnant liquor or basic carbonate precipitate currently in production. Nicaro products contain Ni and Co in the ratio of 64:1. 29 ref. (C23; Ni, Co)

235-C.* Sodium Reduction of Titanic Chloride. V. E. Homme, M. M. Wong and D. H. Baker, Jr. *U. S. Bureau of Mines, Report of Investigations 5398*, May 1958, 29 ref.

Reduction is performed in two steps: titanic chloride is reduced with molten sodium to titanous chloride and salt at a furnace temperature of 400 to 750° C. according to the reaction $2\,Na + TiCl_4 \rightarrow TiCl_2 + 2\,NaCl$. The lower valent Ti in this melt is then reduced to metallic Ti of high purity, at furnace temperatures of 800 to 850° C., by adding sodium to complete the requirements of the reaction $2\,Na + TiCl_2 \rightarrow Ti + 2\,NaCl$. (C1p; Ti)

236-C. Preparation of Metallic Plutonium on a Gram Scale. F. Anselin, P. Faugeras and E. Grison. *United Kingdom Atomic Energy Authority*, IGRL. T/W.63, 1958, 4 p. (From *Comptes Rendus des Sciences de L' Academie des Sciences*, v. 242, 1956, p. 1996-1998.)

Preparation of plutonium trifluoride and its conversion to Pu metal by thermal reduction with Ca.
(C26; Pu, *Ca*)

237-C.* (French.) Industrial Scale Extraction and Purification of Samarium and Europium. C. de Rohden. *Energie Nucleaire*, v. 2, Jan-Mar. 1958, p. 21-28.

Description of two pieces of apparatus for continuous or semicontinuous preparation of about 1 kg. per day of oxide of samarium, and about 100 kg. per day of oxide of europium, both having purity of over 99%. Capacity of apparatus could be doubled if demand justified extraction on larger scale.
(C-general, 1-52; Sm, Eu)

238-C.* Effect of Nitrogen and Vacuum Degassing on Properties of a Cast Aluminum-Silicon-Magnesium Alloy (Type 356). R. K. Owens, H. W. Antes and R. E. Edelman. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 424-431.

The tensile properties of this alloy were insensitive to method of degassing. The effects of gas content and porosity on the ultimate and yield strength were determined for virgin and remelted heats. 11 ref. (C5m; 1-73, Al-b)

239-C. Mechanized Production of Carbon for Aluminum Smelting. *Chemical and Process Engineering*, v. 39, Mar. 1958, p. 79-81.

(C23; Al)

240-C. A New Dimension in Metallurgy. *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 25A-26A.

Combination of high temperatures, utilizing electron bombardment as a heat source, with ultrasonic vacuum results in metals of extremely high purity. (C25, 1-73, 1-74)

241-C.* The Oxidation Rates of Lump Copper-Iron Sulphides. T. A. Henderson. *Institution of Mining and Metallurgy, Bulletin*, no. 619, June 1958, p. 437-462.

The rates of oxidation in atmospheric air of lump FeS, Cu_2S and a number of mattes have been measured for roasting temperatures above 600° C. Oxide layers formed most rapidly on Cu_2S and mattes of very high Cu content and most slowly on mattes containing about 66% Cu. Reduction in the activation energy of the oxidation process occurred with increase in Cu content of the matte above 40%. 12 ref. (C21, N15, N16; Cu)

242-C. Study of the Electrolytic Production of Nickel From Chloride Electrolytes. N. P. Fedotyev and Z. I. Dmitreshova. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 227-237. (Translation by Consultants Bureau, Inc.)

16 ref. (C23n; Ni)

243-C. Tantalum, Niobium and Beryllium. G. L. Miller. *Metal Industry*, v. 92, June 20, 1958, p. 507-509.

Methods of extraction and refining. (C-general; Ta, Be, Cb)

244-C. Methods of Uranium Recovery in the U. S. A. *Mining Journal*, v. 250, June 13, 1958, p. 693.

Resin-in-pulp and solvent extraction processes.
(C-general; B14, U)

245-C.* New Refining Process Purifies Refractory Metals. Stanley H. Dayton. *Mining World*, v. 20, July 1958, p. 40-43.

The process utilizes electron bombardment of impure metal stock

in a furnace under a vacuum of 10^{-7} atmospheres. Electron bombardment melts the stock. Impurities are boiled from the melt if the vapor pressure of contaminating compounds exceeds a pressure of about 10^{-5} atmospheres.
(C28, 1-73; Be-a, Ti-a, V-a, Zr-a, Cb-a)

246-C. Treatment of Gold-Tin Concentrate From the Astronomer Mine, Russell River Goldfield, North Queensland. J. T. Woodcock. *University of Melbourne, Commonwealth Scientific and Industrial Research Organization, Ore-Dressing Investigations,* Report no. 540, July 1957, 31 p.

(C-general; Au)

247-C. (German.) Fusion Electrolysis in an Aluminum Plant. G. Lange. *Elektro-Wärme,* v. 16, Mar. 1958, p. 87-90.

(C23; Al)

248-C.* (French.) Contribution to the Problem of the Continuous Cyaniding of Gold Ores. R. Badescu and Gh. Vanci. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 121-126.

Advantages of using a larger number of cyaniding tanks of smaller capacity is brought out with the aid of mathematical computation.
(C19p; Au)

249-C. (English.) Separation of Lanthanum From Other Cerium Earths. P. J. Reddy, D. V. N. Sarma and Bh. S. V. Rhagnava Rao. *Fresenius' Zeitschrift für Analytische Chemie,* v. 160, Mar. 25, 1958, p. 426-435.

4 ref. (C28; La)

250-C. (German.) Welding Rectifiers for Arc Melting of Titanium and Zirconium. E. Bergmann. *Elektrowärme,* no. 1/2, Jan-Feb. 1958, p. 38-39.

Metals with a high melting point which are highly reactive when in contact with gases are vacuum melted by means of an electric arc. Welding rectifiers are used as power supply units, and, where necessary, several units are controlled in parallel. Usual practice is to operate one controlled unit and then three noncontrolled units, each with a rating of 2500 amp, in parallel. 3 ref. (C5h, W29a; Ti, Zr)

251-C. (German.) Reduction of Metal Chlorides With Aluminum. H. Balduin. *Monatshefte für Chemie,* v. 88, Jan. 28, 1958, p. 1038-1047.

21 ref. (C26; *Al*)

252-C. (German.) Experiments in Electrolytic Separation of Metallic Chromium From Chromic Salt Solutions. Susumu Morioka and Hideki Yamaoka. *Technology Reports of the Tohoku University,* v. 22, 1957, p. 121-127.

6 ref. (C23n; Cr)

253-C. (German.) Spectroscopic Examination of Vaporization of Binary Alloys. E. Saur and E. Unger. *Zeitschrift für Naturforschung,* v. 13 a, Feb. 1958, p. 72-79.

Melts of binary alloys were vaporized at constant temperature and condensed in several separated fractions. Weighing of the condensates and spectroscopic examination of their compounds made the experimental determination of the separation during the process of vaporization possible. 15 ref. (C22, S11k)

254-C. (Italian.) On the High Degree of Purification of Aluminum, Uranium and Iron by the Zone Melting Method. P. Albert. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 136-142.

Zone melting techniques. Results of analysis and physical examination of state of purity. Examples of new properties obtained through the extreme degree of purification achieved. 19 ref.
(C28k; Al-a, Fe-a, U-a)

255-C. (Italian.) Purification and Preparation of Germanium and Silicon. S. E. Bradshaw. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 143-148.

Methods of preparation examined from theoretical and practical points of view. The zone melting method is the most suitable for obtaining the required degree of purity.
(C28k; Ge, Si)

256-C. (Italian.) Theory and Practice of Zone Melting. G. Baralis. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 149-156.

Zone melting for obtaining high purity, such as required for Ge and Si for use in electronic tubes. Zone melting apparatus and numerous applications of the method. 120 ref. (C28k; Ge, Si)

257-C. (Japanese.) Preparation of Indium Antimonide. Ryoji Takahashi. *Engineering Research Institute of Tokyo University, Annual Report,* v. 16, Mar. 1958, p. 97-100.

Indium antimonide prepared by melting and zone melting in argon gas. (C28k; In, Sb)

258-C.* Experiments to Establish Conditions for the Continuous Reduction of Titanium Tetrachloride to the Metal by Sodium. J. Smolinski, J. C. Hannam and A. L. Leach. *Journal of Applied Chemistry,* v. 8, June 1958, p. 375-386.

Titanium tetrachloride was reduced continuously to the metal by sodium dissolved in fused chlorides; Ti metal of hardness down to 180 D.P.N. was extracted from the reactor without interrupting the process of reduction. 8 ref. (C1p; Ti-a)

259-C.* Pouring Semi-Continuous Cast Ingots. R. A. Jones and V. Kondic. *Metal Industry,* v. 93, July 4, 1958, p. 3-5.

Characteristics of the casting process for light alloys and Cu-base alloys, emphasizing the hot top method. (C5q; EG-a 38)

260-C.* Indium Purification and Production of an InSb Compound With High Electron Mobility. V. M. Sergeeva and E. L. Shtrum. *Soviet Physics, Technical Physics,* v. 2, no. 12, p. 2507-2510.

Vacuum distillation removed metallic impurities. Electrolysis then removed oxygen and silicon, resulting in 99.9% pure In ingots. 13 ref.
(C23, C25; In)

261-C. (French.) Hydrometallurgical Extraction of Nickel From Rumanian Ores. Alexandru Lupu and Ana Boiangiu. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 77-106.

11 ref. (C19n; Ni)

262-C. (German.) Oxidation of Antimony in Dry Lead Refining. Joachim Barthel. *Bergakademie,* Dec. 1957, p. 630-632.

(C28j; Pb, Sb)

263-C. (German.) Physical Purification of Germanium. Gerhard Raabe. *Chemische Technik,* v. 10, Apr. 1958, p. 203-207.

3 ref. (C28; Ge)

264-C. (German.) Direct Reduction of Lead Sulphide. E. J. Kohlmeyer and H. Brinkmann. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 292, Dec. 1957, p. 275-286.

By blowing hydrogen and air on fusible lead sulphide a practically complete reduction to metallic lead is possible. 11 ref. (C26; Pb)

265-C.* Low-Pressure Way to High Purity Tantalum. *Chemical Week,* July 19, 1958, p. 97-98, 100, 102.

Ingots of up to 110 lb. turned out by high-vacuum furnace have good ductility, low Brinell hardness.
(C25, Q-general, 1-73; Ta)

266-C. Gold Distribution in Cyanided Sulphide Concentrate From Wattle Gully Gold Mine, Chewton, Vic. J. T. Woodcock. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 546,* Oct. 1957, 5 p.

Sample of cyanided concentrate contained 2.48 dwt/ton gold, of which 0.08 dwt/ton was dissolved Au. (C28; Au)

267-C. Vanadium. J. Lomas. *Canadian Mining Journal,* v. 79, July 1958, p. 90-92.

Methods of recovery; properties; applications. (C-general; V)

268-C. Aluminium Reduction Plant at Baie Comeau, Que. C. Miller and W. G. Street. *Engineering Journal,* v. 41, July 1958, p. 41-49.

Canadian British Aluminium Co. smelter. (C-general; Al)

269-C. I.C.I. Titanium Project. *Industrial Chemist,* v. 34, July 1958, p. 365-366.

Arc melting of compacted Ti powder electrodes in a water-cooled copper crucible at the Imperial Chemical Industry's Metals Division plant, Witton, Birmingham, and fabrication of sheet and rod at the Waunarlwydd plant.
(C-general, F-general; Ti-b)

270-C. Extraction and Recovery of Some Rarer Metals. *Mining Journal,* v. 251, July 4, 1958, p. 12-13.

Methods of extracting Mo, Ta, Cb and W. (C-general; Mo, Ta, Cb, W)

271-C. The Common Element Is Zinc. *Oilways,* Aug. 1958, p. 13-19.

Zinc production at the Zinc Smelting Division, St. Joseph Lead Co., Josephtown, Pa. (C-general; Zn)

272-C. Electrolytic Production of the Four-Component Alloys Nickel-Iron-Molybdenum-Manganese and Nickel-Iron-Molybdenum-Copper. T. F. Frantsevich Zabludovskaya, and K. B. Kladnitskaya. *Journal of Applied Chemistry of the USSR,* v. 30, Mar. 1957, p. 423-428. (Translation by Consultants Bureau, Inc.)

12 ref. (C23, Ni, Fe, Mo, Mn, Cu)

273-C. The Iodide Method of Refining Zirconium. G. I. Stepanova and F. I. Busol. *Soviet Journal of Atomic Energy,* v. 3, 1957, p 117-1181.

(C1p; Zr)

274-C. (German.) Sb Distribution in Chilled Ge-Sb. Georg Prörst and Gotthold Zielasek. *Zeitschrift für Angewandte Physik,* May 1958, p. 201-204.

Preparation of Ge semiconductors with Sb impurities.
(C-general; Ge, Sb)

D Iron and Steelmaking

344-D. Refining High-Phosphorus Pig-Iron With Oxygen. Heinrich Rellermeyer, Helmut Knuppel and Johann Sittard. *Iron and Coal Trades Review,* v. 176, p. 1039-1043. (From *Stahl und Eisen,* Sept. 19, 1957.)

Previously abstracted from original. See item 345-D, 1957.
(D10a; ST)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

345-D. Thermodynamics of the Reaction of Dephosphorization of Iron. I. Yu. Koshevnikov and L. A. Shvartsman. *Academy of Sciences of the USSR, Proceedings,* v. 113, 1957, p. 185-188. (Translation by Consultants Bureau, Inc.)

8 ref. (D11n; Fe)

346-D. Development of Deoxidation Process of Rimming Steel. A. A. Bezdeneshnykh. *Stal',* v. 17, Aug. 1957, p. 701-707. (Iron and Steel Institute Translation no. 703.)

Previously abstracted from original. See item 42-D, 1958.
(D9r; ST-d, *Mn,* AD-n)

347-D. Sulphur Exchange Between Gas Phase and Bath of a Basic Open-hearth Furnace. S. N. Stupar. *Stal',* v. 17, Aug. 1957, p. 707-712. (Iron and Steel Institute Translation no. 705.)

Previously abstracted from original. See item 43-D, 1958.
(D11h, D2; ST)

348-D. Influence of Deoxidation With Aluminum on the Quality of Structural Steel. N. G. Antropova. *Stal',* v. 17, Jan. 1957, p. 64-69. (Iron and Steel Institute Translation no. 743.)

Previously abstracted from original. See item 333-D, 1957.
(D11r; ST, *Al,* AD-r)

349-D. Desulphurization in the Basic Steel Converter. Karl Georg Speith. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 152-156. (Iron and Steel Institute Translation no. 876.)

Previously abstracted from original. See item 124-D, 1958.
(D3, D11n; AY)

350-D. Effect of Electro-Inductive Agitation of the Bath on the Metallurgical Reactions in the Electric Arc Furnace. Karl Georg Speith. *Stahl und Eisen,* v. 78, Feb. 20, 1958, p. 215-220. (Iron and Steel Institute Translation no. 906.)

Previously abstracted from original. See item 144-D, 1958. (D5f)

351-D. Automatic Control of Gas Distribution in the Blast Furnace Shaft. I. A. Suchkov and V. V. Burtsev. *Stal',* Feb. 1958, p. 110-113. (Iron and Steel Institute Translation no. 963.)

Previously abstracted from original. See item 205-D, 1958.
(D1f, 18-74)

352-D.* (Russian.) **Investigation of Sinter Formed During Oxidation of Iron in Carbon Dioxide Gas.** V. I. Arkharov. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 251-254.

X-ray study of oxidation of iron in CO_2. The first stage of the reaction is limited by the speed of oxygen supplied to area of reaction. This results in formation of layer of FeO. In subsequent phase, the process is limited by the continuously slowing supply of iron to area of the reaction. This results in formation of an outer layer of Fe_3O_4 (on top of layer FeO). The further structural picture of oxidation in CO_2 is similar to that in steam. The differences in flow between these two stages can be explained by differences in adsorption and desorption of the gaseous components. 6 ref. (D1, R1h; Fe)

353-D.* Desulfurization of Iron and Steel. S. L. Gertsman. *Foundry,* v. 86, Aug. 1958, p. 48-53.

More than 85 heats of acid and basic electric and basic induction steel have been desulphurized by lancing with a carrier gas. Reductions of up to 40% of the steel's original sulphur content can be obtained by lancing basic induction and acid electric steel in the ladle. This operation takes about 2 min. for a 500-lb. melt and is accompanied by a considerable drop in temperature (75 to 150° F.). (D11s)

354-D.* Automatic Charging Control for No. 3 Fairless Blast Furnace. S. P. Curtis, R. F. Schramm and D. W. Fath. *Iron and Steel Engineer,* v. 35, July 1958, p. 73-84.

Charging control for new furnace represents combined knowledge and efforts of operators, furnace builders and control engineers; permits greater flexibility in choosing charging cycles, provides more information to operators and maintenance personnel. (D1a, W17g)

355-D.* (French.) **Analysis of Some Recent Studies of Refractories Used in Steelmaking.** G. Vie. *Industrie Ceramique* no. 497, May 1958, p. 161-165.

Properties of different types of refractory bricks; effect of type of refractory on furnce operation and product quality; life of linings. 14 ref. (D-general; RM-h)

356-D.* (Italian.) **Manufacture of Steel for Castings in the Electric Arc Furnace. Pt. 2.** Giuseppe Violi. *Fonderia,* v. 7, Apr. 1958, p. 118-128.

Composition of charges; metallurgical control; steel-scrap process; coal-scrap process; basic and acid processes and advantages of each. 26 ref. (D5)

357-D.* Continuous Casting Plant. *Indian and Eastern Engineer,* v. 122, Apr. 1958, p. 279, 281.

Eight-strand continuous casting machine being built by Demag A-G for Terni Societa per l'Industria e l'Electricita. (D9q, W19f)

358-D. Designing for Aluminum Permanent Mold Casting. Pt. 3. Tolerances. *Precision Metal Molding,* v. 16, June 1958, p. 28-29, 50.

(D-general, E15, S22)

359-D. Reaction of Iron Ores With Methane in a Fluidized Bed. K. P. Lavrovsky, A. L. Rozental and A. Kh. Eglit. *Academy of Sciences of the USSR, Proceedings,* v. 112, 113, 114, 1957, p. 9-12. (Translation by Consultants Bureau, Inc.)

(D11g; RM-n)

360-D. The Melting of Transformer Steel. Kurt Fellcht and H. Kutscher. *Neue Hütte,* v. 2, Sept. 1957, p. 525-537. (Iron and Steel Institute, Translation no. 948.)

Previously abstracted from original. See item 8-D, 1958.
(D-general, 2-60; SGA-r, AY)

361-D.* (Swedish.) **Some Experiences of Sponge Iron Production in Wiberg-Soderfors Furnaces.** H. Kihlander. *Jernkontorets Annaler,* v. 142, no. 3, 1958, p. 93-104.

Sponge iron furnace operating experience; furnaces found reliable with annual capacity of 30,000 tons sintered pellets suitable as raw material. Coke used as fuel. L.P. gas added to reduction gas increased production and lowered consumption of coke and electrical energy. 9 ref. (D8j)

362-D.* (Russian.) **Improvement in the Quality of the Mixture for Self-Sintering Electrodes.** V. V. Rukavishnikov, *Stal',* v. 18, Mar. 1958, p. 281-285.

To overcome uneven performance of electrodes in ferro-alloy electric arc furnaces, the mix from which the electrode is formed should contain no more than 10% cinder, the discharge of volatile elements should range between 14 to 18% and the ingredients should be uniformly mixed and all foreign substances carefully excluded.
(D5, W18s, T1f, 17-57)

363-D. New Way of Producing Carbon-Free Ferrochromium. I. D. Kirichenko. *Stal',* v. 18, no. 2, 1958, p. 131-137. (Henry Brutcher, Altadena, Calif., Translation no. 4193.)

Development of an economical process for removing carbon from solid high, medium or low-carbon ferrochromiums in vacuum with rich iron ore, nickelous oxide, ferrochromium previously oxidized, etc., making it possible to produce carbon-free ferrochromium with 0.01-0.03% carbon and low silicon content. Thermodynamic analysis of process, claimed to prove that American data on the decarburizing reaction involved are incorrect and that silicon is *not* the best deoxidizer. Confirmation of calculations and deductions by actual experiments. Laboratory furnaces used for study of kinetics of process and determination of its end. Results obtained. Pilot vacuum furnace for production trials. How grinding of the new carbon-free ferrochromium can be facilitated and how the quality of 18-8 steel can be improved by its use.
(D8, 1-73, D11r; Fe, Cr, AD-n)

364-D. Swelling of Magnetite Pellets and Briquets During Reduction. G. V. Gubin. *Izvestiya Akademii Nauk SSSR,* Dec. 1957, p. 76-77. (Henry Brutcher, Altadena, Calif., Translation no. 4199.)

Swelling of iron ore plus carbon pellets and briquets, accompanied by a loss of mechanical strength, during reduction in blast furnace. Experimental arrangement and procedure. Role played by carbon monoxide; effect of reduction temperature. Causes of swelling or contraction of various ores and concentrates.
(D1a, D11g; RM-n, Fe, 6-67, 6-73)

365-D. Influence of Vacuum Melting on Properties of Various Materials. W. F. Moore. *Foundry Trade Journal,* v. 104, June 1958, p. 741-745.

Properties of vacuum-induction melted materials can be classified into those which can be classified by conventional methods as well as by vacuum-melting methods, and those which must be vacuum melted because of composition. Latter reveal definite improvements in mechanical and electrical properties and in corrosion resistance. 4 ref. (D8m, C5; 1-73)

366-D.* (French.) **Study of Blast Furnace Phenomena.** B. Menuet-Guilbaud. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 133, June 1957, 23 p. (Reprint from *Revue de Metallurgie,* v. 54, Mar. 1957.)

Apparatus for sampling gas at tuyere level; method of evaluating results; eight typical samplings. 11 ref. (D1, S12h)

367-D.* (German.) **Activity of Manganese in Liquid Iron-Manganese-Carbon Solutions.** Hermann Schenck and Franz Neumann. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 263-267.

The distribution equilibria of Mn between Fe and Ag and the influence of carbon upon the activity of Mn. Conditions for the forma-

tion of manganese carbide and the influence of Mn on the saturation limits of Fe with respect to C. Diagrams for the activity of Mn in relation to concentration in temperature ranges between 1450 and 1600° C. Limits in the various phase diagrams determined and verified. 17 ref. (D11m, P12b; Fe, Mn, Ag)

368-D.* (German.) **Performance of Low-Shaft Blast Furnaces at VEB West Works at Calbe and Experiments for Output Increase Through Increase of Blast Volume.** Kurt Sauberlich and Hans-Joachim Lux. *Archiv für das Eisenhüttenwesen*, v. 3, May 1958, p. 294-300.

On a battery of various size low-shaft furnaces the relative output was compared over a period of several months. Among other characteristics the amount of blast and the inlet surface influence the performance considerably. Modifications on some furnaces, which consisted mainly of opening up blast entrance posts and increasing blast volume, resulted in 23% higher output without increasing coke consumption. Tables for operating data, raw material, slag analysis and composition of charges. (D8p; CI-a)

369-D. (German.) **Application of Oxygen-Enriched Air Blast in the Production of Spiegeleisen in the Low-Shaft Furnace.** Helmut Grohmann. *Bergakademie*, Dec. 1957, p. 632.

(D8p, W17h)

370-D.* (German.) **Application of Oxygen for the Production of Pig Iron in Low-Shaft Blast Furnaces.** Kurt Sauberlich, Helmut Grohmann and Gerhard Richter. *Neue Hütte*, v. 3, Apr. 1958, p. 225-232.

Extensive operating tests to determine the feasibility of adding up to 35% oxygen to the blast. Theoretical fundamentals of oxygen blast. Tests run in a big low-shaft furnace with 25% oxygen proved to give 26% higher yield, reducing coke consumption by 6.1%. 12 ref. (D8p; CI-a)

371-D. (German.) **Reconstruction and First Results of Operation of Krupp-Renn Plant at Salzgitter-Watenstedt.** Dietrich Fastje. *Stahl und Eisen*, v. 78, June 12, 1958, p. 784-792.

Reasons for reconstruction; future development of direct reduction and possible use of drum-type furnace for reduction of iron ores. (D8j, 1-55; Fe)

372-D. (German.) **Dust Produced During Blowing in Converter as Indicator of Refining When Using Oxygen-Enriched Air.** Ludwig von Bogdandy and Heinz-Dieter Pantke. *Stahl und Eisen*, v. 78, June 12, 1958, p. 792-798.

Metallurgical reactions during last 2 min. of blowing; quantity, grain size, composition of dust from transition point to termination of blowing; vaporization in the converter; measuring quantities of discharged dust for control purposes; use of extinction method for determination of final point. 22 ref. (D3b, D11g, S18s; ST)

373-D. (German.) **Optical Measurement of Temperature in Converter Refinement of Steel.** Paul Höller and Hans Smit. *Stahl und Eisen*, v. 78, June 12, 1958, p. 799-804.

7 ref. (D3f, S16a; ST)

374-D.* (Italian.) **Manufacture of Steel for Castings in the Electric Arc Furnace. Pt. 1.** Giuseppe Violi. *Fonderia Italiana*, v. 7, Feb. 1958, p. 43-52.

Equipment and operational requirements for mills making steels for castings; development of electric steelmaking and recent improvements in arc furnaces; basic and acid processes and advantages of each; preponderance of acid in U. S., basic in Europe. (D5, W17s; ST)

375-D.* **Pre-Treatment of Molten Iron.** L. Cook. *Iron and Coal Trades Review*, v. 177, July 11, 1958, p. 87-93.

Use of the oxygen lance and simultaneous injection of powdered lime, limestone, mill-scale, fluorspar and bauxite, in various combinations, can be an effective means of desiliconization or dephosphorization of molten phosphoric pig-iron. (D11n, D1h; Fe)

376-D. Refining Grain Structure by Inoculation. *General Electric Review*, July 1958, p. 26-27.

Function of inoculants, mechanism of ingot solidification at liquid-solid interface. (D9r; SS)

377-D. Open Hearth Fuel Atomization With a Reaction-Type Jet Burner. G. W. Hinds and A. L. Hodge. *Industrial Heating*, v. 25, July 1958, p. 1380-1384.

Increased production of open-hearth steel through higher firing rates necessitates the use of an inherently high-temperature combustion system. Atomization of liquid fuel by a gas jet flame. (D2h, W18r)

378-D. Oxygen/Steam Mixed Blast in the Basic Converters at Esperance-Longjoz—Past, Present and Future Development. Jean Daubersv. *Iron and Coal Trades Review*, v. 176, June 13, 1958, p. 1439-1441.

(D3, 1-65; ST)

379-D. Direct Reduction Processes for Iron Ore. P. E. Cavanagh. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 78-86.

Processes in commercial use and those under development, especially the Ontario Research Foundation direct steel process, and jet smelting. (D8; RM-n, Fe)

380-D. Survey of Modern Blast-Furnace Techniques. T. P. Colclough. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 87-95.

7 ref. (D1)

381-D. Use of Oxygen, Moisture and High Top Pressure in Blast-Furnace Operation. J. M. Strassburger. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 105-120.

5 ref. (D1h)

382-D. (French.) **Preparation of Blast-Furnace Charges in France.** J. Astier. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 125-132.

(D1a, RM-n, Fe)

383-D. Experience With Sinter Burden in Swedish Blast-Furnaces. Ulf Notini. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 133-138.

Study of use of self-fluxing sinter. Results in reduced coke consumption, increased output, more consistent pig iron. (D1a; Fe)

384-D. A Programme-Controlled Reduction Test for Blast-Furnace Burdens. Rolf Linder. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 139-149.

Attempt to correlate behavior of ore in the laboratory with behavior in the blast furnace, based on degree of oxidation of ore at 1000°. (D1; RM-n, Fe)

385-D. (French.) **Chronicle of Steelmaking. The Competitive Position of the Martin Furnace.** G. Grenier. *Echo des Mines et de la Metallurgie*, no. 3515, Apr. 1958, p. 231-233.

(To be continued.) 8 ref. (D2, A4q)

386-D. (French.) **Experimental Investigation of the Oxidizing Power of Slags in Steel Manufacture. Pt. I. Equilibrium Relationships in Liquid SiO_2-CaO-MgO, FeO, Fe_2O_3 Slags Melted in Open Crucibles at 1550 and 1650° C. in the Absence of Metallic Iron.** Trajan T. Negresco and Marie Bolgiu. *Revue de Métallurgie (Bucarest)*, v. 1, 1956, p. 5-32.

14 ref. (D11r; RM-q)

387-D. (German.) **New Knowledge in the Production of Pig Iron in the Blast Furnaces of the German Democratic Republic.** Georg von Struve and Rolf Ebert. *Bergakademie*, v. 10, Apr. 1958, p. 229-235.

19 ref. (D1)

388-D. (German.) **Hydrogen in Steel Production.** Werner. *Bergakademie*, v. 10, Apr. 1958, p. 251-253.

Reduction of content of hydrogen in steel in liquid state. 3 ref. (D11h, D11s; ST)

389-D. (German.) **Development of Methods and Explosive Charges for Tapping in Blast Furnaces or Other Metallurgical Melting Furnaces.** Werner Gutmann. *Explosivstoffe*, v. 6, May 1958, p. 105-108.

(D9n, D1c)

390-D. (German.) **Significance of Diffusion in the Reduction of Iron Ores.** L. V. Bogdandy and W. Janke. *Zeitschrift für Elektrochemie-Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 61, 1957, p. 1146-1153.

Theoretical formula derived from experimental results; the final formula can be used for predetermination of the reduction speed. 25 ref. (D11g, Fe)

391-D. (German.) **Kinetics and Mechanism of Reaction Between Liquid Alloys and Slags.** Carl Wagner. *Zeitschrift für Elektrochemie-Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 62, 1958, p. 386-389.

10 ref. (D11n)

392-D. (Russian.) **Increasing Blast Furnace Productivity by Grading and Sorting the Charge.** V. E. Levchenko. *Metallurg*, v. 3, May 1958, p. 4-6.

(D1a)

393-D. (Russian.) **Blowing Oxygen From Top of Bessemer Converter.** S. I. Lifshits and S. G. Afanas'ev. *Metallurg*, v. 3, May 1958, p. 12-16.

Change from acid to basic lining and directing oxygen blast from top instead of bottom of converter greatly improves qualities of steel. (D3f; ST)

394-D.* (Russian.) **Burden Hanging During Iron Smelting When Using Oxygen Enriched Blast.** S. K. Trekalo. *Stal'*, June 1958, p. 489-495.

Frequent burden hangings in blast furnace when using oxygen-enriched blast is explained by extreme intensification of furnace operating rate even when ordinary blast is used. An insignificant increase of circumferential furnace gas velocity leads to burden hanging. Experiments with kryptol electric furnaces where burden hanging was eliminated. (D1a, D5a, D11g)

395-D.* (Russian.) **Influence of Combustion Zone Location on Blast Furnace Performance.** B. S. Failkov and V. K. Gruzinov. *Stal'*, June 1958, p. 495-502.

Investigation of interdependence between parameters of the combustion zone and air blast and distribu-

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

tion of burden materials at the furnace top makes it possible to define more accurately the role of the boshes and to determine extent of protrusion of tuyeres into the furnace. Importance of proper location of combustion zones and maximum CO_2 content in the gas to blast furnace operations; need to more accurately relate distribution of burden to combustion zone. 21 ref. (D1, D11j, W17g, 17-51)

396-D.* (Russian.) **Dust Formation in Openhearth During Intensified Use of Oxygen.** Yun Son Chol' and E. V. Abrosimov. *Stal'*, June 1958, p. 506-509.

Investigation of dust formation in openhearth furnace when using oxygen makes possible determination of mechanism of this phenomenon, the physical nature of dust particles and the fluctuation of dust formation rate during various stages of heat during modifications of the process. Increasing rate of oxygen enrichment increases dust formation since it speeds process of decarbonization. 5 ref. (D2g, D11g)

397-D. (Russian.) **Effect of Vacuum Melting on Quality of Steel.** Ya. M. Bokshitskii, A. V. Emyashev, A. M. Zubko and M. M. Filippycheva. *Stal'*, June 1958, p. 520-525.

Vacuum melting of steel considerably improves metal composition, reduces impurities and gas content and improves mechanical properties, particularly its resilience. Experiments with structural steels show that vacuum melted steel (as compared with open melted), contains 5 times fewer impurities; oxygen content is reduced from 0.0140 to 0.0028%, nitrogen from 0.0109 to 0.0050%. 5 ref.
(D8m, P-general, Q-general)

398-D.* (Russian.) **"Superheating" of Chromium-Nickel Structural Steel.** L. D. Kossovskii and V. S. Pakuleva. *Stal'*, June 1958, p. 556-558.

Formation of coarse crystalline fractures of Cr-Ni structural steels depends on cooling speed of the bloom before heat treatment (applied for the prevention of floc formation), and is not connected with temperature of heated ingots before rolling. Gradual, intermediate cooling of blooms before further heat treatment has considerably reduced spoilage. (D8q; ST, Cr, Ni, 9-72)

399-D. (French.) **Composition of Blast Furnace Gas. Applied to the Calculation of Coke Yield.** A. Decker and L. Bousmanne. *Revue Universelle des Mines*, v. 101, Mar. 1958, p. 80-105.

General formulas of gas volumes in relation to coke yield and different influencing factors (temperature, humidity, silicon content).
(D1b, D11; RM-j43)

400-D. (Russian.) **Lessening the Expenditure of Aluminum in Deoxidation of Steel.** A. M. Ofengenden and R. P. Nesterovich. *Metallurg*, v. 3, June 1958, p. 11-12.

(D11r; Al)

401-D. (Russian.) **Automatic Control of Blast Distribution Between Tuyeres of Blast Furnace.** V. Yu. Kaganov. *Stal'*, June 1958, p. 504-505.

Decisive effect of blast—its temperature, volume and pressure—on productivity of blast furnaces.
(D1, D11j)

402-D. (Russian.) **Combined Secondary Cooling of Continuously Cast Steel Ingots.** A. D. Akimenko, A. M. Makushin and A. A. Skvortsov. *Stal'*, June 1958, p. 509-511.

(D8q, D9q)

403-D. (Russian.) **Preparation of Mold Trains for Bottom Pouring of Steel.** S. N. Bystrov and V. M. Borevskii. *Stal'*, June 1958, p. 513-514.

(D9k, D9p, W19c)

404-D. (Russian.) **Mechanization of Labor Consuming Operations in Electric Steel Melting.** M. G. Dmitrienko and A. I. Sapko. *Stal'*, June 1958, p. 525-529.

(D-general, E10r, 18-74; ST)

405-D. (Russian.) **Effectiveness of Use of Oxygen in Ferrous Metallurgy.** V. F. Andreev. *Stal'*, June 1958, p. 561-568.

Production of steel by use of oxygen in converter is 50% cheaper than by openhearth. Soviet steel industry plans to increase output of steel by oxygen to 40% of total steel production. 13 ref. (D-general, A4p; O)

E Foundry

544-E. Progress in Iron Castings. H. Bornstein. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 1-16.

Review of casting practice in the U. S. over past 40 yr.
(E-general, A2; CI)

545-E. Austenitic Manganese Steel Technology in an Australian Foundry. Hedley Thomas. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 36-40.

(E-general; SS-e, *Mn*)

546-E.* Effect of Ferrosilicon and Magnesium Inoculation on Nuclei Formation in Cast Iron. Fredrik Hurum. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 66-74.

Examination of the process whereby ferrosilicon absorbs iron from the melt prior to dissolving. Three phases, epsilon (FeSi), alpha (silicoferrite) and gamma (silico-austenite) were formed. Results of further studies of graphite spherulites. (E25q, CI-r)

547-E.* Effect of Temperature on the pH of Foundry Sands. N. D. Brinkmann and Gordon Gottschalk. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 84-87.

Apparently calcium carbide present in particles of sea shells in sand changes to calcium oxide at 1500°, resulting in marked change in pH. Rise in pH is associated with decrease in physical properties of baked cores. (E18r, 2-61)

548-E. European Foundries and Pattern Shops. E. T. Kindt. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 94-96.

(E-general, 18-67)

549-E.* Hot Tearing of Magnesium Casting Alloys. R. A. Dodd, W. A. Pollard and J. W. Meier. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 100-117.

Susceptibility to hot tearing of Mg-Al and Mg-Zn alloys containing up to 10% alloying additions, and of 17 other important Mg alloy compositions determined by various methods, involving measurement of the cracking tendency of flat rings cast in steel or sand molds. 39 ref. (E25, 2-60; Mg-b, 9-72)

550-E.* How to Determine Moisture Requirements of Molding Sands. R. W. Heine, E. H. King and J. S. Schumacher. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 118-122.

Water requirements for obtaining peak strength in molding sands are quantitatively related to the ingredients of the sand mixture.
(E18p)

551-E.* Mold Hardness: What It Means! R. W. Heine, E. H. King and J. S. Schumacher. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 123-127.

Basic relationship of mold hardness to green strength. The relationship is generally applicable to clay-saturated sands. In clay-poor sands, the relationship depends on clay content and factors influencing clay distribution. 5 ref.
(E18r, E19)

552-E.* Correlation Between Casting Surface and Hot Properties of Molding Sands. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 128-133.

Two simple one-specimen tests to measure scabbing, buckling and rattailing tendencies of molding sands for iron casting. (E18r)

553-E.* Effects of Charge Materials and Melting Conditions on Properties of Malleable Iron. E. H. Belter and R. W. Heine. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 134-139.

Annual progress report on A.F.S. malleable iron research project. Effect of pig iron variations in the charge on the casting properties, mechanical properties and annealability of malleable iron; variations in melting technique in an effort to change residual element recovery after melting; correlation of Si oxidation with changes in residual element recovery; effect of holding time at 2800° F. on the mechanical properties. 9 ref. (E10, CI-s)

554-E.* Influence of Sand Grain Distribution on Green-Sand Casting Finish. C. E. McQuiston. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 188-206.

The mean sand grain diameter is the most important factor contributing to roughness. The spread contributes to roughness but to a lesser degree than the mean diameter. The effect of squeeze pressure on roughness is minor in the range of this experiment. 31 ref. (E18r)

555-E.* Fluidity of a Series of Magnesium Alloys. J. E. Niesse, M. C. Flemings and H. F. Taylor. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 207-211.

Fluidity of Mg-rich portions of seven different Mg alloy systems presented as a function of composition. Data for both constant superheat and constant pouring temperature. Addition of Zr to Mg alloys lowered the fluidity at low alloy content, but slightly raised the fluidity at alloy contents above 4%. 5 ref. (E25p, 2-60; Mg-b)

556-E. Efficient Cupola Operation. *Australian Manufacturer*, v. 42, Mar. 1, 1958, p. 60-65, 70.

Interdependent factors affecting cupola operations such as types of lining, cokes, sulphur in the cast iron, fluxes and tuyere design.
(E10a)

557-E.* Desulphurization of Iron and Steel. Pt. 1. S. L. Gertsman. *Canadian Metalworking*, v. 21, June 1958, p. 33-35, 37.

More scrap iron may be used in the cupola if the sulphur is reduced; there is less danger of producing iron with an improper Mn:S ratio; less Mn can be used for steel; hot tearing characteristics of cast steels are associated with sulphur content. High sulphur appears to increase the tendency toward hot tearing. (E10a, E25; CI, ST)

558-E. Molding Castings for Rolling Stock. J. G. H. Loubser. *Engineer and Foundryman,* v. 22, Feb. 1958, p. 99-107.

(E19, T23)

559-E. Shell Molding—Automated. T. E. W. Preston. *Metalworking Production,* v. 102, June 6, 1958, p. 983-991.

Application of shell-molding technique with a comparatively simple electro-pneumatic system of control. (E16c; 18-74)

560-E. Investigations on the Effect of Heat on the Bonding Properties of Various Bentonites. Franz Hofmann. *Modern Castings,* v. 34, July 1958, p. 31-37.

6 ref. (E18n)

561-E. Gating and Risering Shell Mold Pattern Equipment. D. C. Kidney. *Modern Castings,* v. 34, July 1958, p. 38-40.

(E16c, E22p, E22q)

562-E.* Sodium Silicates for the CO_2 Process. E. A. Lange and R. E. Morey. *Modern Castings,* v. 34, July 1958, p. 41-49.

Chemistry of the CO_2-sodium silicate process for bonding foundry sand. The amount of CO_2 necessary to develop maximum gassed strength is that required to increase the SiO_2 to Na_2O ratio of the sodium silicate to 4. The efficiency of the CO_2 gassing process can be greatly increased by diluting the CO_2 with air. (E18n)

563-E.* Foundry Applications of the Calcium Carbide Injection Process. W. R. Lysobey and A. E. Tull. *Modern Castings,* v. 34, July 1958, p. 53-61.

Injection of calcium carbide in cast iron will reduce chill formation and promote the formation of Type-A graphite in a pearlitic matrix. The extent of the calcium carbide injection treatment required to produce the optimum physical properties and microstructure will depend upon iron composition and solidification rate. (E25q; CI)

564-E.* Performance of Chills on High Strength Magnesium Alloy Sand Castings of Various Section Thicknesses. Merton C. Flemings, Richard W. Strachan, Ernest J. Poirier and Howard F. Taylor. *Modern Castings,* v. 34, July 1958, p. 62-69.

Effect of section thickness and chilling on the mechanical properties of sand cast Mg alloy test plates. The alloys studied were AZ92A and AZ91C. Plate thickness was varied from ¼ to 1½ in. (E22r; Mg-b)

565-E.* (French.) **What Causes Pinholes?** S. A. Sanders. *Fonderie,* v. 145, Feb. 1958, p. 53-63.

Thermodynamic study indicates that hydrogen dissolved in steel does not create sufficient gas pressure to form cavities and that no hydrogen-oxygen reaction accompanies formation of steam. Probable cause of pinholes is carbon oxide which forms as by reaction of carbon in steel with iron oxide formed at mold-metal interface. (Pinholes do not form in presence of Al in solution because oxygen reacts with Al rather than with carbon). Theory is advanced that many so-called pinholes should be classified as inclusions. Cermet-type inclusions, also called ceroxides, and their influence on pinhole porosity. 19 ref. (E25, 9-68, 9-69; ST)

566-E.* (French.) **Oxygen in the Cupola.** Francois Danis. *Fonderie,* v. 145, Feb. 1958, p. 79-86.

Super-oxygenation of blast increases hourly production, decreases percentage of loss of Si, improves castability of melt. Addition of oxygen apparently has no effect on carburization and loss of Mn during melting. (E10d; ST)

567-E.* (French.) **Influence of Rate of Air Supply, Coke Size and Coke Rate Between Charges on Cupola Operation.** Francois Danis and Maurice Decrop. *Fonderie,* v. 148, May 1958, p. 215-233.

Thermal balance sheets and productivity of cupola (700 mm. nominal i.d.) for varied operating conditions during 19 experimental melts. All materials charged into cupola, all products of fusion were carefully measured and analyzed; constant check of temperatures was maintained. The 90-120 coke appears to be best suited for standard, foundry-size cupola. (E10a; RM-j43, CI)

568-E. (German.) **Fluid Dynamics Applied to the Construction of Die Casting Dies for Aluminum Die Casting.** Hermann Kessler. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 250-256.

Flow of molten metal into die casting dies; vacuum die casting process. (E13, 1-73, W19n)

569-E.* (Japanese.) **Segregation in Castings. Pt. 8.** Kazuo Yasuda. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 379-385.

Basic experiments on segregation conducted to substantiate theoretical mechanism of the shape of segregation curves. When the size of castings was reduced the flat portion of the segregation curve corresponding to the intermediate layer of castings was lower and the degree of segregation decreased. Segregation in cylindrical castings was higher than in flat castings. 6 ref. (E25n, 9-69)

570-E.* (Japanese.) **Study on the Shell Molding Process. Pt. 1. Influence of Thickness and Bending Strength of Shell.** Hideji Hotta. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 385-394.

Influence of kinds of silica sands, additional amounts of synthetic resins and wetting agents on temperature, time of setting on the curing of shell molds and bending strength and thickness. Both the thickness and the bending strength of shell become greater as the setting temperature, time and the curing temperature become greater. 12 ref. (E19C)

571-E.* (Japanese.) **Studies of Foundry Silica Sands. Pt. 4. Crushing of New Foundry Silica Sands.** Umeji Harada and Keizo Nishiyama. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 395-405.

Geological origin, crystal structure, hot properties and refractory properties of four silica sands. Crushing method is by ramming. Grain sizes of the sands are 35, 48, 65, 100 and 150 mesh. (E18r)

572-E.* (Japanese.) **Binding Materials for Foundry Sand. Inorganic Binders.** Hiromu Tanimura and Shizuo Mukae. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 405-417.

Clays were submitted to chemical analysis, X-ray analysis, electron microscopy and differential thermal analysis, while their swelling capacity, base exchange capacity, pH value and others were measured and correlated with binding capacity. 17 ref. (E18n)

573-E.* (Spanish.) **Porosity in 85-5-5-5 Type Bronze Castings.** Sebastian F. Matas. *Revista de Ciencia Aplicada,* v. 12, Mar-Apr. 1958, p. 136-144.

Contraction during solidification, gases, metal-mold reaction as principal causes of porosity. Means of reducing porosity. Need for further study of such factors as compatibility of 85-5-5-5 bronze and mold materials, metal-mold reaction, control of absorbed gases, amount of phosphorus used for deoxidation, effect of binders and addition agents used in mold and core sand, degassing methods, crystal structure of alloy. 15 ref. (E25; Cu-s, 9-68)

574-E.* Influence of Vibration on Solidifying Metals. A. H. Freedman and J. F. Wallace. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 578-589.

Vibration applied to solidifying Al-Cu alloys refined grain size, improved tensile properties. Hypothesis offered to explain observations. 8 ref. (E25n; EG-a38)

575-E.* Tin as an Alloy in Gray Cast Iron. J. A. Davis, D. E. Krause and H. W. Lownie. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 590-597.

Tin contents of 0.10% or less resulted in slightly improved mechanical properties without producing any undesirable properties. No embrittling effects of Sn were found at levels up to 0.10%, and it is in this range that Sn had its major beneficial effects upon microstructure and mechanical properties. (E25q; CI-n, Sn)

576-E.* An Appraisal of Steels for Aluminum Die Casting Dies. J. C. Hamaker and G. A. Roberts. *Die Casting Engineer,* v. 2, June 1958, p. 11-13.

Causes of heat checking, pitting, impingement soldering; requirements of a good die casting steel; precautions for maximum die life. (E13; SS)

577-E. (German.) **Prevention of Casting Defects.** Hans Reininger. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 137-142.

Proper gating assures uniform heating and cooling in the most intricate parts and eliminates defective hardening. Model altering and use of chills in the critical parts also advised. After annealing slowly cooling prevents overhardened surfaces. The growth of metal at high temperatures can be avoided by use of cast iron of high heat stability. Fine-grained graphitic hard iron advised ferritized through afterward annealing. At lower temperatures (e.g., up to 500° C.) certain alloying elements such as Cr, Mn, V, act as stabilizators. Examples are from the practice with micrographs and illustrations. (E-general)

578-E.* (German.) **Investigation on the Use of Calcium Carbide in Cupola**

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

Furnace Operation. Kurt Giesen. *Giesserei-Praxis,* v. 76, June 10, 1958, p. 219-222.

A report on the use of a specially developed calcium carbide for cupola furnace work. Data show that addition of carbide increases the flow temperature of the iron without increasing the sulphur content and lowers sulphur content up to about 35% if the usual melting temperature is maintained. 11 ref. (E10a; AD-a)

579-E.* (Italian.) **Improvements in Cupola Operation. Results Obtained From a Basic Cupola.** Mario Olivo. *Fonderia,* v. 7, Apr. 1958, p. 137-142.

Conversion of standard foundry cupola from acid to basic process, using cold blast, with no forced cooling between melts, resulted in following advantages: almost total elimination of shrinkage cavities in castings; elimination of slag formation in ladle; cast iron of high machinability even when Si content is low; improved mechanical properties of product; possibility of refining charges composed of low-grade miscellaneous cast iron scrap, scrap iron and steel, with almost total elimination of pig iron requirement; reduced manufacturing costs due principally to possibilities of using less expensive charges. Suggestion is made that cupola with I. D. of 800 mm. or more be adopted to make application of refractory linings easier and melting more even, and to avoid formation of abundant and not always fluid slag. 12 ref. (E10a)

580-E. Pressure Tightness in 85-5-5-5 Bronze Castings. P. K. Trojan and R. A. Flinn. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 238-246.

To investigate the basic nature of leakage under pressure for this material and to evaluate the effects of melting and molding variables, a sensitive and reproducible test bar and leak test procedure have been developed. 5 ref. (E11; Cu-S)

581-E.* Investigation of Metallurgical and Mechanical Effects in the Development of Hot Tearing. H. F. Bishop, C. G. Ackerlind and W. S. Pellini. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 247-258.

The contraction characteristics of metals in sub-solidus temperature ranges is an important factor in development of either adverse or beneficial mechanical conditions with respect to hot tearing. 7 ref. (E25n, 9-21)

582-E.* Performance of Chills on High Strength-High Ductility Sand-Mold Castings of Various Section Thicknesses. M. C. Flemings, P. J. Norton and H. F. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 259-266.

Data showing effect of casting thickness on ability of chills to increase mechanical properties of cast Al alloy sections varying from ¼ to 1½ in. thick; data on end-chilled plates of 195 and 356 alloys. Mechanical properties of the end-chilled plates decrease with increasing distance from the chills. 6 ref. (E22r, 5-66, Al-b)

583-E. Gating of Gray Iron Castings. J. F. Wallace and E. B. Evans. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 267-275.

(E22p; CI-n)

584-E. Temperature Drop in Pouring Ladles. Pt. 2. V. Paschkis and J. W. Hlinka. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 276-281.

(E23)

585-E.* Effect of Small Tin and Cadmium Additions to Aluminum-Copper Alloys. H. V. Sulinski, R. C. Harris and S. Lipson. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 282-291.

The effect of small quantities of Sn and Cd on the aging characteristics and tensile properties of cast and heat treated Al-Cu alloys centering around the commercial 195 alloy composition (Al-4.5% Cu). Results suggest that the Sn additions are slightly more effective than the Cd. 19 ref. (E25; Al-b, Cu-b)

586-E. Practical Studies of Veining Tendencies. George Di Sylvestro. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 323-339.

The following factors promote or affect veining in steel castings: increased gas evolution; variations in raw materials; coarser sand; insufficient venting; insufficient baking; silica flour additions. The veining defect may be improved by the use of a test casting as a standard for comparison, quality control of raw materials, and use of finer sand, iron oxide, bentonite, fire clay, and core binders with a low gas content and rate of evolution. (E18r)

587-E.* Inoculation of Gray Cast Iron. N. C. McClure, A. U. Khan, D. D. McGrady and H. L. Womochel. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 340-349.

The most effective inoculant for the improvement of mechanical properties in these experiments was the Ca-Si alloy with approximately 30% Ca. Ca additions effected a reduction of the carbon content of molten iron by formation of a carbide of low solubility; it is suggested that calcium carbide is involved in the mechanism of Type-A graphite formation. 9 ref. (E25q; CI-n, *Ca, Si*)

588-E. Hydrogen as It Affects Steel Castings. Arthur F. Gross. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 365-373.

Through proper melting control the steel foundryman can eliminate any permanent defects attributable to hydrogen. The loss of tensile ductility is a temporary effect which eventually disappears on natural aging and may be quickly eliminated by artificial, low-temperature aging treatments. Hydrogen embrittlement does not make the steels notch sensitive. Flaking as a result of hydrogen is seldom if ever encountered in castings. (E25; ST, 9-68)

589-E.* Mechanical Properties of Cast Titanium-Iron and Titanium-Aluminum-Iron Alloys. N. Hehner, H. W. Antes and R. E. Edelman. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 374-378.

An investigation to determine the as-cast tensile and impact properties of Ti-Fe and Ti-Al-Fe cast alloys. The tensile strength of both binary and ternary alloys increased appreciably as the Fe content was increased. Results indicate that a Ti-3% Al-5% Fe would be particularly amenable to heat treatment. 10 ref. (Q21, Q27a; Ti-b, Al, Fe)

590-E.* Effect of Various Clays and of Tempering Method on Sand Properties and Casting Quality. A. E. Murton. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 379-385.

Four commercial foundry bonding clays were tested to determine the properties they would produce in foundry sand mixtures. The clays tested were western and southern bentonite, Ohio fire clay, and Illinois illite. 6 ref. (E18r)

591-E.* Feed Metal Requirements for Ductile Iron Castings. C. Reynolds, J. Maitre and H. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 386-390.

Precipitating graphite is beneficial in lowering feed metal requirements, and if present in sufficient amount many castings can be made in rigid molds without risers. The main effect of increasing silicon is allowing more graphite to precipitate because of the decreased solubility of carbon in austenite. (E23; CI-s)

592-E. Transport of Feed Metal During Solidification of Tapered Steel Bars. E. J. Sullivan, C. M. Adams and H. F. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 394-401.

Experimental and theoretical studies of the padding requirements for cylindrical cast plain carbon steel bars. 9 ref. (E23; ST-a)

593-E. Properties of Molding Sands Under Conditions of Gradient Heating. N. C. Howells, R. E. Morey and H. F. Bishop. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 402-408.

A new hot strength test used on molding and core sands. Various mixtures were tested under conditions which represent mold interface regions for castings that solidify in the vicinity of 2000 to 2400° F. 6 ref. (E18r)

594-E.* Investigation of the Effect of Processing Variables on Mechanical Properties of Pearlitic Malleable Iron. H. H. Johnson and W. K. Bock. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 450-461.

Statistical study of atmosphere, tempering time and temperature, quenching time, temperature and rate and other variables on mechanical properties. (E25; CI-s)

595-E.* Vacuum Die Casting. David Morgenstern. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 494-498.

Use of a vacuum box around the die, rather than locating the vacuum within the die, permits more rapid operation, minimizes air entrapment, improves mechanical properties of casting. (E13, 1-73)

596-E. Status of the Technology for Casting Titanium. G. H. Schippereit, R. M. Lang and J. G. Kura. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 499-512.

Survey of furnace types, molds, precision casting, properties of cast alloys, potential market, availability. 36 ref. (E-general; Ti)

597-E.* The Use of Expendable Graphitic Molds in the Production of Sound, Ductile Titanium Castings. A. L. Feild and R. E. Edelman. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 517-522.

These molds can be made using conventional foundry techniques. The molds are expendable, economical to produce, and strong. In addition, molten Ti metal poured in section thicknesses as great as 2 in.

will not be contaminated by the mold material. (E19; Ti-b, NM-k36)

598-E. "Slice 'em Yourself" Castings. *American Machinist,* v. 102, June 1958, p. 76-77.

Continuously cast Cu alloy rods, tubes and shapes up to 12 ft. long can be cut apart into individual castings. All standard tin-bronze alloys, including Pb, Zn and Ni, bearing varieties, can be cast to size. (E-general; Cu)

599-E. The Ford "Thames" Foundry. *Automobile Engineer,* v. 48, June 1958, p. 233-246.

New Ford Motor Co. foundry in England produces four-cylinder and six-cylinder engine blocks and heads. About 42 different castings are handled. Equipment and layout. (E-general, T21b; 18-67)

600-E.* Kinetics of Alloy Solidification. K. A. Jackson. *Canadian Journal of Physics,* v. 36, June 1958, p. 683-691.

Alloy systems discussed in terms of the theory of interface kinetics. The nonequilibrium equations which are developed reduce to the thermodynamic expressions if the system is in equilibrium. Several types of phase diagrams are discussed. It is shown that a phase diagram gives a reasonably good estimate of the concentrations at an interface if the system is not in equilibrium. (E25n, M24)

601-E. High Temperature Tooling for Die Casting. E. E. Hall. *Die Casting Engineer,* v. 2, Mar. 1958, p. 10-11, 22.

Briefly related chemical composition of hot work toolsteels with minimum distortion during heat treatment. Resistance to heat checking, toughness, wear resistance, resistance to softening, thermal conductivity and other properties necessary for die casting die materials. (E13, W19n; TS)

602-E. Solve Your Die Temperature Control Problems. H. A. Meyrick. *Die Casting Engineer,* v. 2, Mar. 1958, p. 12-13.

Variation of die casting die temperature with pressure, time and metal temperature; control of die temperatures by system employing high velocity circulation of a control temperature liquid. (E13, W19n, 2-61)

603-E.* Steps to Take in Eliminating Hot Tears. Hubert Chappie. *Foundry,* v. 86, July 1958, p. 82-84.

Experiences with large castings of 0.40 carbon steel. Corrective actions required to avoid hot tears included use of wood flour, multiple gating, external chills, staggering of ribs, control carbon content. (E-general; CN, 9-71)

604-E. Mechanized Molding Line Produces Gray Iron Brake Drums. Robert H. Herrmann. *Foundry,* v. 86, July 1958, p. 90-93.

(E19; CI)

605-E. The Importance of Clay Particle Size. Walter E. Gruver. *Foundry,* v. 86, July 1958, p. 94-96.

Relation of clay particle size to properties of foundry sands; method for size determination. (E18r)

606-E. Gray Iron Foundry Pursues Continued Plant Improvement. Kenneth L. Mountain. *Foundry,* v. 86, July 1958, p. 98-101.

At the Inter-State Foundry Co., Indianapolis. (E-general; 18-67, CI-n)

607-E.* The Establishment of Dimensional Norms for Die Castings. H. K. Barton. *Machinery,* v. 92, no. 2359, Jan. 31, 1958, p. 267-276.

Tolerances are discussed at length, with particular reference to standards introduced by the Zinc Alloy Die Casters' Association for the guidance of British designers and buyers. Short history of the die casting industry; tendency for users of die castings to "over specify" is discussed. Factors which affect the dimensional accuracy and the A.D.C.I. tolerances. (E13, A2, S22)

608-E. Die Cast Record Changer. *Metal Industry,* v. 92, June 20, 1958, p. 511-513.

Die casting practice at Collaro Ltd. in the production of cam gear, spigot housing and turntable bosses for record changers. (E13, T10c)

609-E. Investment Casting in Europe. H. J. Marshall. *Precision Metal Molding,* v. 16, June 1958, p. 24-26.

(E15)

610-E. A Vacuum System for Die Casting Aluminum. G. R. Morton. *Precision Metal Molding,* v. 16, June 1958, p. 30-32.

(E13, 1-73; Al)

611-E. (French.) **Future Progress in the Melting of Metals.** Frank Hudson. *Fonderie Belge,* v. 28, May 1958, p. 154-162.

Fuels and melting furnaces; use of hydrogen, oxygen and nitrogen. (Conclusion.) 10 ref. (E10, W18, RM-j, RM-k, RM-n)

612-E.* (Italian.) **Testing of Oily Sand Binders.** Rinaldo Cattaneo. *Fonderia,* v. 7, May 1958, p. 201-208.

Procedures and equipment for determining viscosity, specific weight and iodine number of binders; significance of these properties. (To be continued.) (E18n)

613-E.* (Italian.) **Formless Refractories for Foundry Use.** Luihi Ferro. *Fonderia,* v. 7, May 1958, p. 209-214.

Bulk refractory materials were formed into test pieces. Behavior of basic and acid mixtures, both green and baked, under slag erosion and hot and cold compression tests. High resistance of a basic mixture to an acid slag was noted. (E10; RM-h)

614-E.* (Russian.) **Modification of Heat Resistant Al-Si Alloys.** T. I. Orlova. *Liteinoe Proizvodstvo,* Apr. 1958, p. 31-32.

Through small addition of B, Ti and P to hypereutectic Al-Si alloys it becomes possible to use alloy for casting pistons which are highly heat resistant, readily machinable, and can be produced very cheaply. 12 ref. (E25q, T21b, 2-60; Al, Si, *B, P, Ti*)

615-E.* Decarburization of White Irons Under Non-Graphitizing Conditions. C. T. Moore. *B.C.I.R.A., Journal of Research and Development,* v. 7, June 1958, p. 258-261.

In white irons, carbide solution in austenite is a limited factor influencing the rate of carbon removal by gaseous decarburization. Free iron sulphide also seems to reduce the rate of solution of carbide in austenite. (E25; CI-p)

616-E.* Some Factors Influencing the Incidence of Inverse Greyness in White Irons. C. T. Moore. *B.C.I.R.A., Journal of Research and Development,* v. 7, June 1958, p. 262-267.

The effect of ladle additions of B, Bi and ferromanganese, and the effect of sulphur content of the molding sand, on the incidence of inverse grayness in a blackheart malleable iron. (E11, E25; CI-p, AD-p)

617-E.* Dross Defects in Nodular Iron Castings. A. G. Fuller. *B.C.I.R.A., Journal of Research and Development,* v. 7, June 1958, p. 268-285.

Ladle additions of tellurium in conjunction with cerium have potent effect in reducing dross defects. Control of Mg alloy addition and of Al content is necessary. Other factors include coal dust and moisture content of green sand molds, type of molding material, inoculant used, pouring temperature and gating system. (E11, E25, CI-r, AD-p)

618-E.* (German.) **New Ways of Using Precision Casting.** A. Krekeler. *Industrie-Anzeiger,* v. 80 June 3, 1958, p. 639-641.

Precision casting is used for parts difficult to manufacture by conventional means. An example taken from the turbine field shows that with the aid of pattern assembly it is possible to produce items which were outside the scope of conventional machining methods. Applications include complicated tools in high speed steel, rocket engines, turbines, compressors. 6 ref. (E15)

619-E. Mechanized Manufacture of Flaskless Carbon Dioxide-Waterglass Foundry Molds. K. Haake. *Giessereitechnik,* v. 3, no. 9, 1957, p. 193-197. (Henry Brutcher, Altadena, Calif., Translation no 4213.)

Report on mechanized sand drying and cooling installation and the manufacture of molds and cores by the carbon dioxide-waterglass process without the use of flasks. Foundry mechanization program. Centralized supply of carbon dioxide in foundry. Percentage data on economics of a change-over from green molds made in flasks. Plan for completely mechanized operation. (E18n, E19, W19g)

620-E. Controlled Gas Content in Foundry Work. E. Scheuer. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 534-542.

Laboratory tests indicated that gas content of the melt is the critical factor in control of surface shrinkage effects. A hydrogen bubbler was designed to regulate this content. 14 ref. (E25s; Al-b)

621-E. Carbon Refractories. Gordon B. Tatum. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 543-549.

Various carbon shapes used for refractory lining in the foundry. For lining cupolas certain combinations of materials are most satisfactory for particular cupola designs and operating conditions. Construction and maintenance features. (E-general, 1-52, RM-h 39)

622-E. Rigging Design of a Typical High Strength, High Ductility Aluminum Casting. Merton C. Flemings, Patrick J. Norton and Howard F. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 550-555.

By careful control of chilling and other variables in casting of Al, ultimate tensile strength is increased up to 95%, yield strength up to 63% and elongation, 1300%. 4 ref. (E22, Q27a; Al-b)

623-E. Link-Belt's New Foundry Provides Efficient Operations. Robert H. Herrmann. *Foundry,* v. 86, Aug. 1958, p. 40-47.

Standard and pearlitic malleable castings weighing up to 70 lb. are produced in green sand and shell

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

molds in this recently completed mechanized foundry.
(E11, E16c, 18-74; CI-s)

624-E. Controlling Casting Quality Through Sand Testing. Harry W. Dietert. *Foundry,* v. 86, Aug. 1958, p. 58-61.

Two elevated-temperature tests allow determination of tendency of a given sand to cause slabs, rat-tails or buckles. (E18r)

625-E. (German.) **Metal Melting in Medium Frequency Induction Furnaces.** H. Kluge. *Giesserei-Praxis,* v. 76, Apr. 10, 1958, p. 123-126.

(E10r, 1-69)

626-E. (German.) **Economy and Cost Calculation in the Foundry.** A. Hohmann. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 142-145.

(E-general, 17-53)

627-E. (German.) **Durville Process Applied to Sand Casting.** Friedrich Reile. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 146-147.

(E19, E18)

628-E. (German.) **Development of the CO_2 Process.** A. Hohmann. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 150-151.

(E18n)

629-E. (German.) **Steel Castings.** Fr. Walter. *Industrie-Anzeiger,* no. 35, May 2, 1958, p. 19-21.

(E-general; ST)

630-E. (German.) **"Heavy" Light Metal Casting.** Wolfgang Buechen. *Industrie-Anzeiger,* no. 35, May 2, 1958, p. 30-31.

(E-general; Al, Mg, Ti)

631-E. (German.) **Production and Application of Nodular Cast Iron.** H. Timmerbeil. *VDI-Berichte,* v. 27, 1958, p. 29-38.

Four production methods; application for heat resistant castings. 4 ref. (E-general, CI-r)

632-E.* (Italian.) **Desulphurization in the Furnace by Means of Soda.** Enrico Balzarini. *Fonderia,* v. 7, Apr. 1958, p. 152-154.

Elimination of sodium carbonate from cupola charge made very little difference in sulphur and total carbon contents of white cast iron and made possible direct pouring from cupola at sufficiently high temperature to produce iron of low sulphur content. (E10a; CI-p, AD-a)

633-E. (Italian.) **Application of Statistical Quality Control in the Investment Casting Process.** G. Postogna. *Fonderia Italiana,* v. 7, Feb. 1958, p. 57-61.

(E15, S12)

634-E. (Italian.) **Plant Design for Mechanized Foundries.** Guglielmo Somigli. *Fonderia Italiana,* v. 7, Mar. 1958, p. 88-98.

(E-general, 18-67, 18-74)

635-E. (Italian.) **Modernization and Mechanization of an Ingot Mold Foundry. Sand Processing, Molding, Organization.** Aldo Rege and Nicola Monniello. *Fonderia Italiana,* v. 7, Mar. 1958, p. 99-104.

(E-general, W19c, 18-74)

636-E. (Italian.) **Statistical Quality Control in the Foundry.** Roberto Sacerdote. *Fonderia Italiana,* v. 7, May 1958, p. 169-172.

(E-general, S12)

637-E. From Conventional Lined Cupola to Liningless Hot-Blast Cupola. E. L. W. Löbbecke. *British Foundryman,* v. 51, July 1958, p. 331-339.

Results of recent research and practical experience with liningless cupolas and their characteristic melting technique. 10 ref. (E10a)

638-E. Some Notes on the Shell-Moulding Process. T. H. Weaver. *British Foundryman,* v. 51, July 1958, p. 343-347.

Applications of the shell-molding process for different types of casting in various materials. (E16c)

639-E. S. G. Iron-Foundry Technology. D. K. Coutts and S. A. Anant. *Indian and Eastern Engineer,* v. 122, Apr. 1958, p. 267, 269, 270.

Foundry technology for spheroidal graphite cast iron. (E-general; CI-r)

640-E. (German.) **Automation in Foundries.** Paul Schiegries. *Giesserei,* v. 45, June 19, 1958, p. 363-365.

Competitive processes of fabrication; bath-tub fabrication; American methods. (E-general, 18-74)

641-E. (German.) **A Modern Melting Plant for Cast Iron.** Victor Frey. *Giesserei,* v. 45, July 3, 1958, p. 397-402.

(E18, W18; CI)

642-E. (German.) **Molding Sand Mixtures.** Hans Reininger. *Giesserei-Praxis,* no. 13, July 10, 1958, p. 255-259.

Blanzer green sand + quartz sand, Blanzer sand + fireclay, fireclay + quartz sand, sieved fireclay + Blanzer sand; magnesite + quartz sand, magnesite + Blanzer green sand, mixtures with used sand. (E18p)

643-E. (German.) **Modern Statistical Control in Foundry Work.** A. Hohmann. *Giesserei-Praxis,* no. 13, July 10, 1958, p. 259-261.

(E-general, S12)

644-E. (German.) **Resins for Models, Pattern Plates and Core Boxes.** H. Kalpers. *Giesserei-Praxis,* no. 13, July 10, 1958, p. 262-265.

(E17, E21; NM-d)

645-E. (German.) **New Developments in Casting and Molding.** K. Strauss. *Technik und Betrieb,* v. 10, June 1958, p. 82-83.

Croning method, CO_2 hardening, precision casting, Shaw method.
(E-general)

646-E. (Russian.) **Mechanization of Plate Production for Magnesite-Chromite Cupolas.** V. P. Emel'vanov. *Metallurg,* v. 3, May 1958, p. 20-24.

(E10a, 18-74; ST, 4-53)

647-E.* **An Appraisal of Steels for Aluminum Die Casting Dies.** J. C. Hamaker and G. A. Roberts. *Die Casting Engineer,* v. 2, June 1958, p. 11-13.

Requirements for properties of good die steels; three principal types of failure—heat checking, pitting and impingment soldering.
(E13, W19n; Al, ST)

648-E.* (French.) **Use of Fluxes in Melting of Light Alloys.** Fernand Dabel. *Revue de l'Aluminium,* v. 35, May 1958, p. 555-563.

Use of various fluxes to cope with problems arising in Al melting; fluxes to eliminate porosity and give suitable surface stage; solid and gaseous fluxes to eliminate occluded gas and refining fluxes for coarse grain.
(E10, E25q, E25s; Al-b, RM-q)

649-E.* (German.) **Brinell Hardness of Aluminum Sand Castings From Scrap.** Hans Reininger. *Giesserei-Praxis,* no. 10, May 1958, p. 189-193.

Inapplicability of Rockwell's and Vickers' tests; examination of seven sources of error in Brinell and X-ray testing. (E11, Q29; Al, RM-p)

650-E. Co_2 Process for Experimental Castings. *Australasian Manufacturer,* v. 43, June 28, 1958, p. 76-77.
(E18n)

651-E. Feeding Systems for Gravity-Die-Castings. D. Miller. *Foundry Trade Journal,* v. 105, July 24, 1958, p. 109-111.

Principles in designing feeding systems. (E13, E22)

652-E. Design of Die-Castings. Pt. 8. H. K. Barton. *Metal Industry,* v. 93, July 18, 1958, p. 47-49.

Basic design principles, emphasizing that final design should be based on function, not preliminary sketches. (E13, 17-51)

653-E. Investigation of Some New Zealand Sands for Foundry Moulding. T. E. J. Scahill. *New Zealand Journal of Science,* v. 1, July 29, 1958, p. 342-360.

Physical and chemical properties investigated and compared with A.F.S. recommended properties to assess their suitability for molding purposes. (E18)

654-E. (German.) **Modern Drying of Ladles and Molds.** H. Herrmann. *Giesserei-Praxis,* no. 10, May 1958, p. 196-197.

Coke, oil, gas and electric resistance furnaces.
(E-general, W19k, W19b, W19g)

655-E. (German.) **My Experience in Coremaking.** Otto Knitter. *Giesserei-Praxis,* no. 10, May 1958, p. 198-200.

Construction, preparation and maintenance of core flasks; materials for coremaking; composition and preparation of various molding compounds; drying of cores; defects and their causes. (E21)

656-E. (German.) **Dressing of Molds, Cores and Chills.** H. Kron. *Giesserei-Praxis,* no. 10, May 1958, p. 204-205.

Composition of white and black washes; manual and mechanical dressing; use of special mixers; appropriate dressing technique in case of molds, cores and chills. (E19)

657-E. (German.) **Production of Molds With Chemically Hardened Sands Without Use of Mold Boxes.** Miroslav Bednarik. *Giessereitechnik,* v. 4, Apr. 1958, p. 78-79.

4 ref. (E18n)

658-E. (German.) **Increasing Production of Circular Castings.** Heinz Kühne. *Giessereitechnik,* v. 4, May 1958, p. 106-107.

(E-general, A5)

659-E. (German.) **Elimination of Porosity of Cylinders by Use of Steel-Shot Cores.** Gerhard Blümel. *Giessereitechnik,* v. 4, May 1958, p. 112.

(E21, 9-68)

660-E. (Book.) **American Foundrymen's Society, Transactions,** v. 65, May 1957. 605 p. American Foundrymen's Society, Golf & Wolf Rds., Des Plains, Ill.

Proceedings of the 61st Annual Meeting, Cincinnati, Ohio, May 6-10, 1957. Papers abstracted separately.
(E-general)

F Primary Mechanical Working

226-F.* (German.) **Resistance of Lead and Lead Alloys to Upsetting.** Erich Pelzel. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 236-239.

Resistance to upsetting of lead with additions of Cu, Zn, Sb, Bi, Sn, Cd, Li, Te and Ag at various temperatures and their various effects. (F22j, 17-52; Pb, 2-60)

227-F.* Some Practical Solutions to Hot Mill Problems. R. A. Smith and A. D. Patton. *Iron and Steel Engineer,* v. 35, July 1958, p. 92-96.

How following problems were han-

dled in 96-in. hot mill of Pittsburgh Works, Jones and Laughlin Steel Corp.: increasing heating furnace capacity, skid pipe breakage, quenching of heavy-gage coiled plate for line pipe, increasing roll life, crowning of rolls to provide product suitable for both hot and cold rolled processing and tin plate and galvanizing departments. (F23, W23c)

228-F.* Lubrication Problems in Fabrication of Nuclear Reactor Metals. Paul Lowenstein. *Lubrication Engineering,* v. 14, June 1958, p. 262-265, 273.

Hot extrusion and tube drawing of U, Th, Be and Zr. 4 ref. (F24, F26; U, Th, Be, Zr)

229-F.* (French.) **New Method of Rolling Thin-Section Joists.** H. Sedlaczek. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 333-338.

Rolling of joists on traditional mill lines becomes increasingly difficult as webs become thinner and wider, since cooling of metal and forming of flanges present serious problems. Method permits transverse cutting of flanges in original section and utilizes Rendleman method, which facilitates rapid reduction of web thickness by means of a toothed roll. (F23q)

230-F. The Production of Titanium With Particular Reference to Sheet and Rod Processing. *Sheet Metal Industries,* v. 35, July 1958, p. 535-542.

At the Waunarlwydd (South Wales) Works of I.C.I. Ltd., Metals Division. (F-general; Ti-b)

231-F. Hot Precision Forgings and Extrusions. John F. Murphy. *Society of Automotive Engineers, Preprint,* 36C, Mar-Apr. 1958, 18 p.

(F24, G5)

232-F. Automatic Devices Key to Flexibility for Extrusion, Melting Furnace Output. *Western Metalworking,* v. 16, Mar. 1958, p. 50-52.

Modern equipment and automatic material handling devices in brass rod mill make it possible to start an order minutes after receiving it. (F22n, F24a, W12, 18-74; Al, Cu-n)

233-F. BISRA Annual Report for 1957. *Wire Industry,* v. 25, June 1958, p. 571, 573.

Progress in wire-drawing and rod rolling reviewed in the Annual Report of the British Iron and Steel Institute Research Association. (F28, F27)

234-F. (Swedish.) **Wire Drawing. A Survey of Current Literature.** E. Lindstrand. *Jernkontorets Annaler,* v. 142, no. 3, 1958, p. 105-127.

146 ref. (F28)

235-F.* (Swedish.) **Experimental Investigations in Wire Drawing.** Carl Olof von Hofsten and Erik Lindstrand. *Jernkontorets Annaler,* v. 142, no. 3, 1958, p. 128-164.

Experiments on wire drawing machine having speed range of 90 to 1000 ft. per min. deal with influence of different coating on drawing force and temperature. Considers optimum die angle and properties of a rotating die. Temperature measurements found to be well suited for classifying coatings. In drawing annealed carbon steel wire lowest temperature at all speeds and reductions were obtained by using sullcoat in combination with borax. Lowest values of temperature and drawing force obtained with die angles of 14°. Die rotation had no influence on drawing force. (F28, 2-61)

236-F.* Precision Hollow Forgings in Nonferrous Alloys. H. D. Challen. *Metal Treatment and Drop Forging,* v. 25, July 1958, p. 269-274.

Methods of forging developed for use on beta brasses combining stamping and extruding, producing forgings with cores on one axis, and with several cores on different axes. Advantages and limitations of the process. (F22m; EG-a38)

237-F.* Cold Rolling Very Thin Strip. *Australasian Manufacturer,* v. 43, June 21, 1958, p. 44-49.

Methods enable an ordinary two-high rolling mill used in conjunction with a simple insert mill to roll nickel-iron tapes up to 1 in. wide to thicknesses of the order of 0.0001 in. (F23q, 1-52; Ni, Fe)

238-F.* (French.) **Increase in Free Width in the Hot and Cold Rolling of Copper and Brass With Noncalibrated Rollers.** R. Miculescu, S. Bercu and I. Dragan. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 107-112.

On the basis of a series of tests in which all the parameters of interest were taken into account, formulas and nomographs were developed enabling the calculation of the increase in width in the hot and cold rolling of Cu and brass. (F23; Cu, Cu-n)

239-F.* (Russian.) **Increased Efficiency in Rolling With Application of Minus Tolerances.** B. B. Rozin and R. S. Geifman. *Stal',* Jan. 1958, p. 51-55.

Based upon research carried out in high-grade steel plants a method was evolved for calculating the theoretical weight of bar stock. This method is simpler and more accurate than those which are now used. Application of the formula for different conditions. (F23; ST)

240-F.* (German.) **Method of Determining Power and Work Requirements in Drop Forging.** K. Lange. *Industrie-Anzeiger,* v. 80, June 3, 1958, p. 631-634.

Forces and work involved in hot forming depend on the magnitude of the forming operation, dimensions of the work and resistance to deformation. Resistance to deformation, in turn, depends on the type of material and varies with temperature and speed of deformation; it is also affected by frictional factors and shape. Methods of determining the various influencing factors. Diagrams covering a range of drop forging shapes determine the power and work requirements. 8 ref. (F22n)

241-F. Kaiser Starts Rolling Mills at Ravenswood. *Iron and Steel Engineer,* v. 35, July 1958, p. 137-140.

Fully integrated highly automated Al production and fabrication center in West Virginia will have annual production capacity of 170,000 tons of rolled products. (F23, 1-52; ST)

242-F. Hot-Pressing With H. F. Induction Heating. R. Schiesser. *Metalworking Production,* June 27, 1958, p. 1123-1126.

In hot pressing or forging, the blanks are brought to a temperature exceeding the re-crystallization point of the material (steel, brass, light metal alloys). Operation and utilization of Brown Boveri high-frequency generator. (F21b, F22, 1-69)

243-F. Three New Forging and Extrusion Methods. John F. Murphy. *SAE Journal,* v. 66, June 1958, p. 40-42.

Precision gear-forming process; rotary forging process; cross-extrusion process. (F22, F24, T7a)

244-F. (German.) **Rolling Continuously Welded Billets.** A. E. Lendl and R. Preissler. *VDI-Zeitschrift,* v. 100, Feb. 1, 1958, p. 165-171.

Possibility of rolling continuous welded billets into wire and strip. (F23, F28, 4-52, 7-51)

245-F. (Italian.) **Singular Surface Defects Observed on Al-Si-Mg Alloys Extrusions.** F. Busnardo. *Alluminio,* v. 27, May 1958, p. 225-226.

The singular defects observed on the surface of extruded sections are attributed to irregularity of flow. Such defects occur when the ratio between the diameter circumscribed about the section and the diameter of the container is greater than 0.8. (F24, Q3, 9-71; Al, Mg, Si)

246-F. Manufacture and Metallurgy of Flash-Welded Line Pipe. M. A. Scheil, G. E. Fratcher, S. L. Henry and E. H. Uecker. *Engineering Journal,* v. 41, Feb. 1958, p.60-71.

10 ref. (F26p, K3r)

247-F. The Manufacture and Chief Uses of Aluminum Foil. Pt. 1. L. W. Swann. *Light Metals,* v. 21, July, 1958, p. 221-223.

Brief survey of rolling technique and the main applications. (F23, T10g, 17-57; Al)

248-F. New Horizons in Forging Techniques. R. L. Albrecht. *Metal Forming & Fabricating,* v. 20, July 1958, p. 15-16.

(F22)

249-F. Induction Heating for Forging. P. E. Hammarlund and Y. Sundberg. *Metal Treatment and Drop Forging,* v. 25, June 1958, p. 249-253.

Design, frequency selection, power requirements, efficiency, advantages and disadvantages of induction heating. (F22, F21b, 1-69)

250-F. New Wire Mill Opened in Sheffield. *Wire Industry,* v. 25, June 1958, p. 545-547.

Review of the Kingfield Works of Darwins Bright Steels Ltd. (F28, 1-52, 18-67)

251-F. Results of Testing the Operation of Blooming Mills. Pt. 2. Hans Gunther Muller and Werner Lueg. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1583-1593. (Iron and Steel Institute Translation no. 768.)

Previously abstracted from original. See item 41-F, 1958. (F23, W23a, 4-52; ST)

252-F. Effect of Steelmaking Procedure on Billet Quality and Seamless Tube Yields. Vilem Friedrich. *Hutnicke Listy,* Dec. 1957, p. 1077-1083. (Iron and Steel Institute Translation no. 831.)

Previously abstracted from original. See item 132-F, 1958. (F26s; ST-e, ST-g)

253-F. (English.) **Studies on the Rolling of Seamless Steel Tube.** Yoshiaki Yamada, Senzaburo Watake, Katsuro Inoue and Hideo Tani. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 63-65.

4 ref. (F26s; ST)

254-F.* (Russian.) **Light-Type Beam Rolling of Low Alloy Steel.** L. N. Soroko, A. A. Nefedov and V. N. Ershov. *Stah',* June 1958, p. 532-537.

Experimental rolling in 500-mm. rolling mill shows possibility of obtaining from existing equipment a new economical shape with higher mechanical properties at a relatively small reduction of rolling mill productivity. (F23p, W23d; AY)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

255-F. New Rolling Mill at Port Kembla. *Chemical Industry and Engineering*, v. 11, June 1958, p. 18-19.
(F23)

256-F. Measurement of Rolling Force for 70:30 Brass and Aluminum. Yoshinori Tsunekawa, Moriya Oyane and Kohei Kojima. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 81-84.
3 ref. (F23; Al-b, Cu-n)

257-F. Republic Steel Unveils New Bar Mill. *Metal Products Manufacturing*, v. 15, Aug. 1958, p. 49-50.
Eighteen-million dollar addition to the South Chicago plant. (F23, 4-55)

258-F. (Russian.) **Production of Gas Pipes by Electric Welding.** Yu. M. Matveev. *Stal'*, June 1958, p. 541-546.
Welding developments abroad, particularly the use of resistance and induction welding for pipe manufacture. 5 ref. (F26p, K3, K6n)

Secondary Mechanical Working

Forming and Machining

370-G.* (French.) **The Four-Slide Press or Progressive Dies?** J. H. van der Burgt. *Machine Moderne*, v. 52, May 1958, p. 9-20.
Four-slide press provides following advantages for fabrication of thin-wall metal parts: less waste of metal, less risk of tool breakage, longer tool life, lower labor costs, lower tool maintenance costs, closer tolerances. Less set-up time is required and die costs are usually lower for same work done with progressive die; however, if lot is big enough, cost of set-up time and tooling per part will be lower for work done on press. Details for parts in steel, nickel and nickel-steel machined by both methods.
(G1, W24g; ST, Ni)

371-G.* (Japanese.) **Ultrasonic Cutting.** J. Kumabe and M. Masuko. *Japan Society of Mechanical Engineers, Transactions*, v. 24, Feb. 1958, p. 109-114.
Ultrasonic two-dimensional cutting using vibrated bite. The frequency is 18.4 KC (constant), amplitude is variable; technique may be applied to aluminum, brass, mild steel or cast iron. (G24c)

372-G.* Developments in Propane Torch Metal Cutting. J. R. M. Barclay. *Engineer and Foundryman*, v. 22, Apr. 1958, p. 64-66.
Benefits derived from propane cutting include: reduced gas costs; no flashbacks or popping, with consequent long tip life and minimum cutter maintenance costs; quicker starting and a narrower kerf, resulting in higher cutting speeds; less slag and cleaner edges, which mean a saving in workshop time and labor; less cylinder handling. (G22)

373-G.* Carbide and Ceramic Tools in the Finish Turning of Steel. Vladimir Solaja. *Institution of Production Engineers, Journal*, v. 37, June 1958, p. 363-372.
In spite of the fact that the chemical, physical and mechanical characteristics of ceramic tools differ considerably from those of carbide tools, the interesting phenomenon of concentrated tool wear in finish turning of steel (i.e., the formation of grooves at the boundaries of interfaces clearance face/workpiece and rake face/chip) is a characteristic phenomenon in both cases. 16 ref. (G19, Q9, T6n; ST, SGA-j)

374-G. Production of Thick-Based Vessels by Spinning. *Light Metals*, v. 21, June 1958, p. 178-179.
(G13; Al-b)

375-G. Cutting Costs on Turning Operations at Allison. Charles E. Glazier. *Machine and Tool Blue Book*, v. 53, Apr. 1958, p. 114-118.
(G17a, T21b; ST)

376-G. Controlling Grinding Feeds . . . to Micro-Inches. *Machine and Tool Blue Book*, v. 53, Apr. 1958, p. 129-130.
(G18h, T7d, 18-74; ST)

377-G. Got a Tough Milling Job?—Try Chemicals. H. L. Lewis. *Mill and Factory*, v. 63, July 1958, p. 111-112.
Applications and operating procedures for chemical milling. (G24b)

378-G. Controlling Tool Life. L. V. Colwell. *Tool Engineer*, v. 41, July 1958, p. 65-69.
Abstract of paper presented 26th Annual Meeting ASTE. Relates cutting tool life and tool wear with cutting speed, rake angle, feeding force, work material and surface finish. (G17, T6n, Q9)

379-G. High Velocity Machining With Ceramic Tools. Wallace B. Kennedy. *Tool Engineer*, v. 41, July 1958, p. 73-75.
(G17, T6n; NM-f)

380-G.* Cold Extrusion of Titanium. A. M. Sabroff, R. A. Sannicandro and P. D. Frost. *Tool Engineer*, v. 41, July 1958, p. 84-90.
Abstract of paper presented at 26th Annual Meeting ASTE. Experimental study of cold extrusion operations on solid and hollow shapes of unalloyed Ti, punch and die designs, equipment, lubricants, test results for backward and forward extrusions. (G5; Ti-b)

381-G. Cutting and Grinding Fluids. E. L. H. Bastian. *Tool Engineer*, v. 41, July 1958, p. 91-92.
Abstract of paper presented at 26th Annual Meeting ASTE. Types of fluids recommended for cooling and lubricating during various cutting and grinding operating on low carbon, high carbon and stainless steels, cast iron and nonferrous metals including Ni, Cu, Al and Mg alloys. (G17, G18, NM-h)

382-G. Sounding Brass. *Welding and Metal Fabrication*, v. 26, July 1958, p. 259-265.
Modern fabrication techniques employed by Boosey & Hawkes, Ltd., in large-scale production of brass musical instruments, with special reference to tube bending. (To be continued.) (G6; 5-60, Cu-n)

383-G.* Combustion of Liquid Hydrocarbon Fuels for Oxygen Cutting. Dieu Khuong-Huu, Sheldon S. White and Clyde M. Adams, Jr. *Welding Journal*, v. 37, Mar. 1958, p. 101s-106s.
Semi-empirical formula permits calculation of the adiabatic flame temperature for any oxyhydrocarbon flame. Maximum oxygen-hydrocarbon flame temperatures lie between 4900 and 5500° F. and occur when oxygen-to-hydrocarbon ratios are slightly less than stoichiometric. Most efficient use of oxygen is realized when part of the lance oxygen is used for combustion. Convergent-divergent contoured nozzles provide more effective cutting depth. 15 ref. (G22)

384-G. (French.) **Chemical Milling of Aircraft Parts.** C. L. Hibert. *Machine Moderne*, v. 52, May 1958, p. 21-24.
(G24b, T24)

385-G. (German.) **Factors Governing the Selection of Drilling Machines. Pt. 1.** E. Schulz. *Fertigungstechnik*, v. 8, Apr. 1758, p. 171-175.
(G17e, W25p)

386-G. (German.) **Towards a Greater Application of Noncutting Methods of Shaping.** E. Heinze. *Fertigungstechnik*, v. 8, Apr. 1958, p. 181-184.
(G-general)

387-G* Recent Investigations Into the Blanking and Piercing of Sheet Materials. R. Tilsley and F. Howard. *Machinery*, v. 93, July 16, 1958, p. 151-158.
Results of investigation of blanking and stripping forces, finish blanking; effect of die radii.
(G2h; G2j; 4-53)

388-G.* This Is a Cold Heading? Paul A. Meline. *Machine and Tool Blue Book*, v. 53, Aug. 1958, p. 91-98, 100.
Cold heading of electrical contacts of Au, Ag, Pd and other metals with diameters down to 0.0265 in.; ratio of head to wire diameter up to 10 to 1. (G10, 1-67, T1; Ag, Au, Pd)

389-G.* Whirlpool Makes Gears at a 4-a-Minute Clip. Darrell Ward. *Machine and Tool Blue Book*, v. 53, Aug. 1958, p. 102-106.
New method of producing an external helix by use of solid high-speed hollow broach gives 92% drop in production time, close tolerances, improved finish and eliminates further machining. (G17d, G17g)

390-G.* German Developments in Flow-Turning. Ing. W. Bosch. *Metalworking Production*, v. 102, July 18, 1958, p. 1247-1251.
Latest equipment and applications for economical production of a large range of components. (G13)

391-G.* Residual Grinding Stresses Can Be Minimized. M. W. Gormly. *Tool Engineer*, v. 41, Aug. 1958, p. 51-54.
Grinding tests indicate that significant amounts of metal can be removed from a workpiece without inducing serious residual stresses. Review of research work with practical implications of studies on these stresses. (G18, Q25h; 9-72)

392-G.* Forming High-Strength Materials. William W. Wood. *Tool Engineer*, v. 41, Aug. 1958, p. 63-69.
By taking advantage of elevated-temperature creep of structural alloys, they can be formed accurately without springback or buckling. Handwork is nearly eliminated; formability is increased 6 to 10 times. (G23, 2-62; SGB-a)

393-G.* (German.) **Outline of Work Done by the Tool Research Institute at Remscheid, Germany.** E. Barz. *Industrie-Anzeiger*, v. 80, June 3, 1958, p. 635-638.
Investigations of stress conditions in the body and cutting edges of tools to determine working behavior and causes of breakage. Various simplified methods for theoretical and experimental tests on tool bodies; measuring and recording devices for stress conditions in tools of strip and disk form as well as for determining the cutting power and edge holding properties of cutting pliers and bolt cutters. Behavior of chain saws and screwdrivers; heat treatment, corrosion protection and surface treatment of tools. 4 ref. (G17, T6n, Q25h, Ag)

394-G. Extrusion Cuts Time From 3½ to 1.5 Min. Anderson Ashburn.

American Machinist v. 102, July 1958, p. 83-85.

(G5; Cu, Al)

395-G. Forming and Painting Wire Garment Hangers. C. R. Brown. *Industrial Finishing*, v. 34, July 1958, p. 40-42, 44, 46.

Machinery and mechanical procedure used, routines performed by the operators. (G6, L26n, 4-61)

396-G. A Practical Manual for Stamping Design. Pt. 1. Flat Stampings. Carter C. Higgins. *Machine Design*, v. 30, July 10, 1958, p. 101-108.

Principles of sound design for flat stampings. (G3; 17-51)

397-G. The New Vauxhall Press Shop. *Machinery (London)*, v. 92, June 1958, p. 1432-1455.

Body-building shop. Underdriven presses are mounted on a network of girders above a basement, so that routine maintenance and inspection can be carried out without stopping production. (G1, T21a)

398-G. Production of Titanium Rings From Extruded Sections. Neil J. Fiola. *Machinery (London)*, v. 93, July 1958, p. 16-19.

Higher material utilization, coupled with the use of cast ingots for extrusion, appreciably reduced costs as compared with conventional forging techniques. (G11; Ti)

399-G. Factors Affecting Performance in Cylindrical Grinding. J. A. Mueller. *Machinery (London)*, v. 93, July 1958, p. 24-26.

If the wheel is allowed to run off the infeed becomes virtually a plunge cut. The high portion of the wheel face grinds deeper than the low portions and dimensional accuracy of the work cannot be maintained; the favorable contour on the wheel face tends to be destroyed. (G18g)

400-G. How Beryllium Is Machined. D. R. Walker and J. Gubas. *Metalworking Production*, June 27, 1958, p. 1127-1129.

A slow procedure was adopted because of high material cost and concern for surface cracks. Electron microscope studies of machined Be indicated that surface cracks produced by roughing operations can be removed by light cuts followed by a chemical polish. (G17; Be)

401-G. Some Prime Examples of Cold Bending Today. B. F. Bower. *Tooling and Production*, v. 24, July 1958, p. 48-50.

Cold bending is superior to hot bending for accuracy, economy and strength. (G6, 1-67)

402-G. Calculation of Deformation of Bimetallic Bearing Inserts (Bushings) in Die Stamping. L. Yu. Pruzhanskii. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 13-16. (Henry Brutcher, Altadena, Calif., Translation no. 4216.)

When stamping thin inlays for automobile bearings the dimensions vary slightly from those of the dies. Mathematical analysis by which correct dimensions might be obtained may be used also for designing new sizes of inlays providing deviation in the old sizes is known. (G3, T7d, 17-51)

403-G. Effect of Technological Factors on Depth of Strain Hardening in Grinding. Yu. S. Terminasov and A. G. Yakhontov. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 40-43. (Henry Brutcher, Altadena, Calif., Translation no. 4223.)

The inner surfaces of ground steels were studied. Specimens were exposed to electrochemical etching and the hardnesses of respective layers were directly indicated by microhardness. Maximum distortion of structure and change in microhardness were observed in the surface layer at a depth of about 10 microns. (G18, N7e; ST)

404-G. (German.) Method of Impact Extrusion. W. Becker. *Deutsche Farbenzeitschrift*, Mar. 1958, p. 90-92.

(G5)

405-G. (German.) Mechanism of Grinding. Janez Peklenik. *Industrie-Anzeiger*, Jan. 3, 1958, p. 20-27.

9 ref. (G18k)

406-G. (German.) Economic Gas Cutting and Attainable Accuracy. H. Christoph and W. Herzfeld. *Industrie-Anzeiger*, no. 33, Apr. 25, 1958, p. 486-492.

4 ref. (G22g)

407-G. (German.) Cold Saves Steel. A. Wolf. *Maschinenbau*, Jan. 1958, p. 8-10.

Application of extreme cold in machining. 13 ref. (G17, 1-67; ST)

408-G.* (German.) Electro-Arcing and Electrosparking. O. Rudiger and A. Winkelmann. *Metall*, v. 12, May 1958, p. 366-380.

List of all known electrical circuits used for electro-erosion. Characteristics of the method—rate of metal removal, electrode consumption, profile and form accuracy, surface accuracy, effects on the structure of the workpiece and oscillation frequency. Various theories for the electro-erosion process are critically compared and checked. 34 ref. (G24a)

409-G.* (German.) Argon Arc Cutting, a New Cutting Process. H. Rotter. *Metall*, v. 12, May 1958, p. 396-401.

Nonferrous metals and steels can be cut economically with a newly developed tungsten arc process under protective gas atmosphere. The apparatus consists of an argon and hydrogen source and d-c. welders in series with a special tungsten electrode holder. Tables for voltage, current and cutting speeds for various materials. Applications. (G22h)

410-G. (German.) Advanced Punching and Stamping Methods. W. P. Romanowski. *Neue Hütte*, v. 3, Apr. 1958, p. 238-246.

New methods for forming metal for hot and cold extrusion, drawing, offsetting, crimping, punching and cold pressure welding. 16 ref. (G-general)

411-G. (German.) Controlled Electro-Arcing and Sparking. J. Siegfried Spizig. *Schriftenreihe Feinbearbeitung*, July 1957, p. 9-87.

Physical processes; electro-erosion machining techniques. 81 ref. (G24a)

412-G. (German.) Tool Wear in Cutting Steel Sheets. Otto Kienzle and Werner Kienzle. *Stahl und Eisen*, v. 78, June 12, 1958, p. 820-829.

Cutting process and wearing phenomena during a closed cut; wear of face, mantle and formation of burr; punching strip or sheets 0.1 to 0.4 mm. thick, made of plain carbon, silicon alloy and stainless steels, using punches and die plates of steel 90MnV 8 and steel X 210 Cr12; effect of roughness and hardness of the tools on wear. (G17, G2, Q9n; ST, 4-53)

413-G. (German.) Chip Formation in Light Metal Alloys, Especially With Hard Metal Tools. *Technica*, Jan. 3, 1958, p. 5-10.

(G17, 6-69; Al, Mg)

414-G. (German.) Machinability of Nodular Cast Iron. W. Grehn. *VDI-Berichte*, v. 27, 1958, p. 23-27.

5 ref. (G17k; CI-r)

415-G. (German.) Causes of Defects in the Hobbing of Teeth. W. Charcut. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 231-233.

5 ref. (G17b, T7a)

416-G. (Italian.) Application of Oxy-Acetylene Cutting in Foundries and Steel Mills. Oscar Grossi. *Fonderia*, v. 7, Apr. 1958, p. 143-151.

7 ref. (G22g)

417-G. (Japanese.) Grinding of Tungsten Carbide by Copper Bonded Diamond Wheels. M. Ohkoshi, K. Sakuma and H. Ohsaki. *Engineering Research Institute in Tokyo University, Annual Report*, v. 16, Mar. 1958, p. 13-19.

The decrease of the amount of metal removed by grinding per unit grinding length depends upon the degree of abrasion of cutting edge and the removal of diamond particles. (G18, W25c; W, Cu, NM-k37)

418-G. (Japanese.) A Sliding Block Type Cutting Test Apparatus. Kenji Okushima. *Japan Society of Mechanical Engineers, Transactions*, v. 24, Feb. 1958, p. 99-102.

Specially designed cutting test apparatus and results obtained. Cutting test with general machine tools such as lathes and millers are usually affected by uncontrolled conditions. Orthogonal cutting test apparatus using a sliding block was designed to diminish such unfavorable effects. (G17, 1-54, 1-53)

419-G. (Japanese.) Study on Low-Temperature Machining. J. Kumabe and M. Masuko. *Japan Society of Mechanical Engineers, Transactions*, v. 24, Feb. 1958, p. 103-108.

Effects of cooling on cutting force and surface roughness. The experiments consisted of orthogonal and conventional cutting of mild steel, brass, duralumin cooled by alcohol and liquid nitrogen. (G17, 1-67; Al-b, Cu-n, ST)

420-G. (Japanese.) Theoretical Research on Chatter Vibration. Shinobu Kato. *Japan Society of Mechanical Engineers, Transactions*, v. 24, Feb. 1958, p. 115-119.

A differential equation shows that chatter is a kind of self-excited vibration. General expression for nonlinear vibration was obtained showing conditions for excitation. (G17)

421-G. (Japanese.) Chatter Frequencies. S. Kato and T. Goshima. *Japan Society of Mechanical Engineers, Transactions*, v. 24, Feb. 1958, p. 119-124.

The frequencies of chatter vibration are calculated using the given equation and discussed in relation to experimental records. Frequencies of chatter in relation to the natural frequency during cutting are accurately indicated by the equation. (G17)

422-G.* Manual on the Machining and Grinding of Titanium and Titanium Alloys. Carl T. Olofson. Titanium Metallurgical Laboratory, TML Report no. 80, Aug. 20, 1957, 82 p. Battelle Memorial Institute, Columbus 1, Ohio.

General machining behavior of Ti; drilling, turning, tapping, precision grinding, abrasive sawing, milling of Ti alloys. Tables indicate machinability index, speeds and horsepower required at the cutting point; properties of Ti. (G17; Ti-b)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

423-G. Influence of Microstructure on the Machinability of a Medium Carbon Steel. A. Gibson. *Australasian Engineer,* v. 50, Feb. 7, 1958, p. 56-60.

8 ref. (G17k, 3-71; CN-p)

424-G. Spark Erosion of Deep Holes. *Australasian Manufacturer,* v. 43, May 24, 1958, p. 62-65.

Spark erosion of deep holes of small diameter, for example, 0.030 by 4 in., was prompted by the need for such holes, from the solid, in nimonic alloys and heat resisting steels used in the manufacture of gas turbine blades. (T7h, SS, Ni, SGA-h)

425-G. A Designer's Guide to the Electronic-Machining Processes for Intricate Holes and Contours in Non-machinable Materials. Frank Twitchell and J. R. Zimmerman. *Machine Design,* v. 30, June 26, 1958, p. 114-120.

Ultrasonic-impact and electrical discharge methods. (G24)

426-G. Savings in Material and Production Costs by Flow Turning. J. Genis and W. Mallindine. *Machinery (London),* v. 93, July 9, 1958, p. 87-92.

Flow turning or "rotary extrusion" enables hollow parts of circular cross-section to be produced from blanks, drawn cups, welded cylinders, forgings or castings. (G13)

427-G. Lapping 4920-Pound Weldments for Radar Systems. C. E. Calebaugh. *Machinery,* v. 64, July 1958, p. 136-139.

(G19p; 7-51)

428-G. Tool Lapping Machines Use Boron Carbide. *Metalworking Production,* v. 102, June 6, 1958, p. 995-996.

Boron-carbide lapping wheels contain 30 times more abrasive at less than 1/3 the price of diamond wheels. (G19p, W25c; B, 6-69)

429-G. Explosives Press-Form Difficult Shapes. D. W. Cole. *Metalworking Production,* v. 102, June 20, 1958, p. 1088-1090.

Virtually every operation possible with a drop hammer, press, brake or stretch-forming press has been duplicated by explosive forming. Pressures up to 3,000,000 psi., temperatures to 9000° F. are theoretically possible. (G-general; NM-k34)

430-G. Cold Working of Metals. D. J. Davis. *Society of Automotive Engineers,* Preprint S65, Feb. 1958, 16 p.

New developments in cold extrusion and cold rolling of low and medium-alloy steel parts. (G5, G11; AY)

431-G. Techniques and Material for Cold Extrusion. Robert W. Gardner. *Society of Automotive Engineers,* Preprint 36A, Mar-Apr. 1958, 13 p.

(G5)

432-G. Problems of the Production of Sheets for Deep Drawing in the Automobile Industry. G. D. Rogoza. *Stal',* v. 17, no. 10, 1957, p. 941-943. (Iron and Steel Institute Translation no. 745.)

Previously abstracted from original. See item 109-G, 1958. (G4f, T21a; ST-c)

433-G. Raising the Temperature of Finishing Deformation as a Means of Reducing the Force Required for Large-Size Forging Blanks. A. V. Altykis and N. I. Belan. *Metallovedenie i Obrabotka Metallov,* no. 10, 1957, p. 48-52. (Iron and Steel Institute Translation no. 917.)

Previously abstracted from original. See item 108-G, 1958. (G3, 2-61; ST, 4-52)

434-G. Comparison of the Advantages and Disadvantages of Turning and Grinding the Grooves in the Rolls of Wire Rod Mills. Pt. 1. Investigation on the Life of Turned and Ground Rolls. Pt. 2. Economic Problems in the Dressing of Rolls. Torsten Palm and Hans Warrol. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 35-39. (Iron and Steel Institute Translation no. 946.)

Previously abstracted from original. See item 107-G, 1958.

(G17a, G18, W23k)

435-G. (Czech.) Air-Operated Flame-Gouging With a Carbon Electrode. Jan Skriniar. *Zvaranie,* v. 7, June 1958, p. 171-175.

(G22g)

436-G. (French.) Effect of Peening With a Gun on the Tensile Fatigue Strength of Butt Welded Joints and Plates With Welded Connections. *Soudage et Techniques Connexes,* v. 12, May-June 1958, p. 231-236.

Weld peening carried out by compressed air gun controlling a multiple tool made up of a bundle of separate needles. Repeated tensile fatigue tests show that the improvement due to the operation may be 35% at least. In particular, the strength of the weakest assemblies (plates with welded connections) can thus be brought to the level of the strongest ones (butt welded joints), when no peening has been performed. (G23n, Q7; 7-51)

437-G. (German.) Characteristics of Spark Erosion Machining of Hot Work Steels. H. Obrig. *Industrie-Anzeiger,* v. 80, June 13, 1958, p. 681-684.

7 ref. (G24a; TS)

438-G. (German.) Improved Machinability of Carburizing Steel Through Heat Treatment. W. Seifert. *Maschinenbau,* Jan. 1958, p. 16-17.

(G17k, 2-64; ST)

439-G. (Japanese.) Study of Cold Machining. Pt. 1. Junichiro Kumabe and Masami Masuko. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 103-108.

Effects of temperature on cutting force and surface roughness in machining mild steel, brass and duralumin. 6 ref. (G17, 2-61; ST, Cu-n, Al-b)

440-G.* The Effect of Grinding on Fatigue Strength. *Australasian Manufacturer,* v. 43, June 14, 1958, p. 78-84.

Good commercial grinding practice did not lower the fatigue limit even though moderately high tensile stresses were generated during grinding. Severe grinding did cause a drop in the fatigue limit, but this was much less than might be expected in view of the high tensile stresses present. Under certain grinding conditions in which grinding oil was used, the surface was actually strengthened enough to raise the fatigue limit appreciably above its normal value. (G18, Q7)

441-G. Milling Titanium Alloys. *Mechanical World and Engineering Record,* July 1958, p. 302-304.

Avoid butt-mill applications (high-speed steel and carbide); use helical carbide slab mills (45° recommended); apply coolant liberally, using sulphur-base oil flow or spray mist coolants; check closely on cutting tool wear, removing dull tools immediately. (G17b; Ti-b)

442-G. Slitting and Shearing at the Westinghouse Columbus Plant. *Metal Products Manufacturing,* v. 15, Aug. 1958, p. 21-23.

(G2)

443-G. Contour-Finishing to 2 Micro-Inches. Rupert Le Grand. *Metalworking Production,* v. 102, July 25, 1958, p. 1299-1301.

Use of air-activated microvalves for checking dimensions, and a combination hydraulic-electric tracer system for machine tool control. (G18m, W25s)

444-G. Costs Reduced—by Integrating Welding and Machining. J. H. Brems. *Tool Engineer,* v. 41, Aug. 1958, p. 75-79.

Application of automation principles to welding has increased production and quality of many parts. Typical examples of parts processed by these techniques, with emphasis on equipment requirements. (G17 K1 1-72)

445-G. (German and French.) Bevel Flame Cutting in Modern Machining. Jean Prat. *Zeitschrift für Schweisstechnik* v. 47, Nov. 1957, p. 275-278.

(To be continued.) (G22)

446-G. (German.) Floturn Process in Manufacturing Cone-Shaped Articles of Aluminum. Pt. 1. H. Reichel. *Fertigungstechnik,* v. 8, May 1958, p. 201-205.

Short outline of spinning and deep drawing and comparison with floturn process. Theoretical considerations on deformation of metal in the latter process. Experimental unit and technique. 6 ref. (G13, Al-b)

447-G. (German.) Evaluation of Tool Wear in Hobbing. A. Kirberg. *Fertigungstechnik,* v. 8, May 1958, p. 217-225.

Computing tables. (G17b)

448-G. (German.) Rough Milling of Square Steel Ingots With Carbide Tools. A. Reinartz. *Industrie-Anzeiger,* no. 36-37, May 9, 1958, p. 60-64.

(G17b, 6-69; ST, 5-59)

449-G. (Japanese.) Cutting Mechanism of Honing. Tokio Sasaki and Kenjiro Okamura. *Japan Society of Mechanical Engineers, Transactions,* v. 142, June 1958, p. 372-377.

Cutting efficiency of honing compared with that of superfinishing. (G19)

450-G. (Japanese.) A Study on Electro-Spark Machining by the Alternating Current. Tokuzo Matsuyama and Takao Kayaba. *Japan Society of Mechanical Engineers, Transactions,* v. 142, June 1958, p. 392-398.

(G24a)

II Powder Metallurgy

107-H. Possibility of Production of Metalloceramic (Sintered) Hard Alloys Based on Chromium, Titanium, and Tungsten Borides. I. I. Iskoldsky and L. P. Bogorodskaya. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 181-188. (Translation by Consultants Bureau, Inc.)

11 ref. (H-general; 6-70, Cr, Ti, W)

108-H.* (English.) Obtaining Metal Powders by Electrolytic Means. Pt. 1. Atanasiu and A. Calusaru. *Revue de Metallurgie (Bucarest),* v. 3, no. 1, 1958, p. 109-120.

The polarization curves (current density against voltage) indicating the transition from the compact to the powder form of the deposition were experimentally obtained for the separation of Cu, Au and Cd from a number of solutions and the powders examined by microphotog-

raphy. For every metal there is found to exist a characteristic potential corresponding to the transition from the compact to the powder deposition of the metal. 10 ref. (H10f; Au, Cd, Cu)

109-H. (German.) **Super Strong Metallic Fibers.** *Technica*, Jan. 31, 1958, p. 103.

(H17)

110-H. (German.) **Sheet Metal From Metal Powder.** Karl Wassmann. *VDI-Zeitschrift*, v. 100, Jan. 1, 1958, p. 22-23.

Production of sheet metal from Cu scraps reduced to powder. (H-general; Cu, 4-53)

111-H. (Japanese.) **Selection of Metals for Cermet Bodies of Alumina.** R. Kiyoura and T. Sato. *Ceramic Association of Japan, Journal*, v. 66, Mar. 1958, p. 49-59.

Selection of metals and fabrication of the cermet. Two factors considered in raising the strength of the product are sintering and texture. (H15, 6-70)

112-H.* **Slip Casting of Metal, Ceramics, and Cermets.** P. E. Rempes, B. C. Weber and M. A. Schwartz. *American Ceramic Society Bulletin*, v. 37, July 1958, p. 334-339.

Principles and problems in slip casting nonplastic powders. Techniques for slip casting a variety of materials, including metals, carbons, cermets, oxides, carbides, borides, fluorides and silicides. New "film technique" overcomes mold release difficulties. 18 ref. (H14)

113-H. **Production and Use of Hydrogen and Dissociated Ammonia Atmospheres for Sintering of Powdered Metals.** M. Roberts Ogle. *Industrial Heating*, v. 25, July 1958, p. 1356-1364.

Production of hydrogen and ammonia-base atmospheres and their role in the sintering of powder metals. (H15q)

114-H. **Production of High Quality Steel Parts by Powder Metallurgy.** Robert Talmage. *Society of Automotive Engineers*, Preprint 36 B, Mar-Apr. 1958, 14 p.

(H-general; ST)

115-H. **Effect of Boron on Liquid-Phase Formation in Sintered Steel, Especially 18 Cr-8Ni Types.** Friederich Benesovsky. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 149-152. (Iron and Steel Institute Translation no. 912.)

Previously abstracted from original. See item 53-H, 1958. (H15, Q-general, R2q, 2-60; SS, AY, *B*)

116-H. **Production and Properties of Sintered Stainless Steel.** Friederich Eisenkolb. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 141-148. (Iron and Steel Institute Translation no. 913.)

Previously abstracted from original. See item 52-H, 1958. (H10, H14, H15, Q-general; ST)

117-H. (German.) **Purification Hardening of Magnetic Sintered Alloys of the Ternary System Al-Ni-Fe and Their Modification by Cu Addition.** G. Ritzow and W. Ebert. *Deutsche Elektrotechnik*, Dec. 1957, p. 527-528.

(H16, P16, J27; Al, Ni, Fe, *Cu*, SGA-n)

118-H. **Powder Metallurgy Comes of Age.** Robert Talmage. *SAE Journal*, v. 66, July 1958, p. 44-47.

Procedures and advantages of powder metallurgy techniques. (H-general)

J Heat Treatment

235-J.* **Tool Steel Failures: Cause and Remedy. Pt. 1.** B. M. Hamilton. *Canadian Metalworking*, v. 21, June 1958, p. 8, 10, 12, 14.

Selection of toolsteel; correct heat treatment; grinding of hardened tools; design; operating conditions. Typical high speed, hot work and cold work steels described. (J-general; TS)

236-J.* **Effects of Heat Treatment of Thin Ferromagnetic Films at Intermediate Temperatures.** E. N. Mitchell. *Journal of Applied Physics*, v. 29, Mar. 1958, p. 286-287.

Iron-nickel films deposited in vacuo in the presence of a magnetic field were annealed in an inert enviornment. When the annealing is performed in an orienting field of 30 o.e., initial magnetic properties of these films can be altered provided the initial temperature is high enough. If a field is applied at right angles to the original preferred direction and in the plane of the film, the magnitude of the magnetic anisotropy can be reduced without changing the preferred direction; the preferred direction of magnetization can be changed if the anneal temperature is sufficiently high. (J23, P16; Fe, Ni, 14-62)

237-J.* **Controlled Atmospheres for Metallurgical Processes. Pt. 1.** I. L. S. Golding. *Metal Treatment and Drop Forging*, v. 25, June 1958, p. 221-226.

Heat treatment processes which are best performed in neutral or active reducing atmospheres; underlying chemical reactions. (J2k)

238-J.* (French.) **Graphitizing in Salt Baths. Application to Cast Irons Having High Sulphur Content.** Olivier Bader and Daniel Godot. *Fonderie*, no. 148, May 1958, p. 211-214.

Economical process uses electrically heated furnace with electrodes immersed in annealing solution. Loading and unloading of parts is simple and flexible, temperature control easy; no wrapping of parts prior to treatment is required; surface oxidation is prevented by formation of thin film of salts which solidifies as parts leave furnace; salt is easily recovered by mechanical methods; cooling can be by still or blown air or oil. 8 ref. (J2j; CI)

239-J.* (German.) **Isothermal Hardening of Case Hardened Steels.** K. H. Estermann. *Industrieblatt*, v. 58, May 1958, p. 185-189.

Test materials and experimental heat treatment; mechanical properties and metallography, applicability of the method in low and high-alloy steels. 4 ref. (J28, J26p; ST)

240-J. (Japanese.) **Surface Hardening of Stainless Steels.** T. Takase. *Metals*, v. 28, June 1958, p. 424-428.

Experimental results of nitride hardening of austenitic 18-8 stainless steel and induction hardening of 13% Cr martensitic stainless steel. (J28k, J2g; SS-c)

241-J.* **Aging Practices for High Strength Ductile Aluminum Alloy HP 356.** Alan B. DeRoss. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 565-569.

Alloy HP 356 exhibits superior ductility and improved tensile and yield strengths. Alloy XHP 356 with a nominal composition of 0.06% Mg, aged, will produce mechanical properties of unusually high strength with comparatively fair ductility. (J27d; Al-b)

242-J.* (Japanese.) **Diaphragms Made of Extremely Thin Beryllium Copper Strips.** J. Miyama, T. Ishihara and H. Utsumi. *Engineering, Research Institute in Tokyo University, Annual Report*, v. 16, Mar. 1958, p. 85-88.

Temper hardening of the blank at 350° C. for 1-1.5 hr., heat treatment at 350° C. for 20 min. after forming and use of epoxy resins adhesives. (J29; Be, Cu)

243-J.* **The Pack Carburizing and Annealing of 4½% Ni-Cr-Mo Case Hardening Steel.** C. Dawes. *Metallurgia*, v. 58, July 1958, p. 3-9.

Various compounds have been used to carburize a 4½% Ni-Cr-Mo steel; influence of these on the "as-quenched" hardness, microstructure, carbon content and annealing characteristic of the carburized case. (J28g; AY)

244-J.* (German.) **Characteristic Quality of Oil-in-Water Emulsions for Quenching in Flame Hardening.** W. H. Kara and F. J. Overkott. *Industrieblatt*, v. 58, May 1958, p. 189-197.

Peculiarity of quenching in flame hardening; necessary properties of quenching emulsion; effect of water hardness and its control; other optimal conditions; experiments with tempered steels; effect of oil concentration, optimal concentration as dependent on steel composition. (J2h, J26, W28p; ST)

245-J.* (German.) **Ionitriding—Technique and Application of Method.** H. Beisswenger. *Industrieblatt*, v. 58, May 1958, p. HT 40-43.

Nitriding mechanism; technique of method; properties of nitrided materials; suitable steels. (J26k; ST)

246-J.* (Russian.) **Causes of Grinding Cracks and How to Eliminate Them.** G. L. Levin. *Vestnik Mashinostroeniya*, v. 38, June 1958, p. 55-57.

The following procedure in quenching plates has eliminated cracks: plates are placed in salt bath consisting of 40-48% sodium chloride, 46-48% calcinated soda and 3-4% sodium cyanide. The latter is added first at the start of the shift and again 4 hr. later. (J26, G18, 9-72)

247-J.* (German.) **Effect of Activating Additions in Solid Carburizers in the Recarburizing of Steels.** Peter Wincierz. *VDI-Zeitschrift*, v. 100, Jan. 1, 1958, p. 21-22.

Activating additions accelerate the recarburization of plain and alloy steel in charcoal. Oxygen content and heat of dissociation of the combinations determine the efficiency of oxide, carbonate and chloride (of Ba and Ca) additions. (J28g; ST)

248-J. **Study of the Factors Influencing the Properties of Heat Treatable Titanium Sheet Alloys.** R. S. Richards, D. L. Day and H. D. Kessler. Titanium Metals Corp. of America (Wright Air Development Center). *U. S. Office of Technical Services*, PB 131769, Mar. 1958, 280 p. $4.

Evaluation of factors which would influence the properties and subsequent heat treating response of Ti alloy sheet. Two highly heat treatable experimental sheet alloys, Ti-2Al-6Mo-2V and Ti-4Al-3Mo-1V, were examined. Effects of cold and warm

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

rolling deformation on mechanical properties. Tensile and bend tests at room and high temperatures on materials annealed in the mill, solution treated and aged conditions. Studies of aging, strain rate effects, strain distribution in long tensile specimens, metallographic examination, dimensional stability measurements, dilatometric measurements during aging, stress-stability tests, modulus measurements and short-time exposure to high temperatures. (J-general, Q-general; Ti-b)

249-J. Open Coil Anneal System Designed for Steel Plant Operation. *Iron and Steel Engineer*, v. 35, June 1958, p. 151-152, 156, 158.
(J23, J2k; ST, 4-53)

250-J. Distortion Reduced by Automatic Marquenching. *Machinery (London)*, v. 92, June 1958, p. 1472-1474.

Workpieces are immersed in oil maintained at a temperature equal to initial transformation value at which martensite begins to form in the carburized case. Results were achieved with automatically operated batch-loaded furnaces and a special-purpose quenching oil. (J26p)

251-J. An Automatic Austempering Plant. R. S. McFall. *Machinery (London)*, v. 93, July 1958, p. 43-46.

In manufacture of typewriters, initial heating of the bars and final cleaning operations are accelerated by automatic machinery without affecting quality. (J26p; ST)

252-J. Heat Treating—Should You Do It Yourself? A. S. Eves. *Modern Machine Shop*, v. 31, June 1958, p. 106-115.

Several important factors which manufacturers should consider in deciding whether to do their own heat treating or subcontract it. (J-general, A5b)

253-J. Surface Hardening of Carbon Steels by High-Temperature Dry Cyaniding. O. K. Kotov. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 16-20. (Henry Brutcher, Altadena, Calif., Translation no. 4217.)

High-temperature dry cyaniding is an improvement on gaseous nitrocementation. Full saturation with nitrogen increases speed of diffusion and eliminates sooty deposits. Chief advantage is raising the fatigue limit. Wear resistance is increased 83% by case hardening, 93% by gaseous nitro-cementation and 172% by high-temperature gas nitro-carburization. 7 ref. (J28j, Q9; CN)

254-J.* (French.) **Method of Controlled Slack Quenching of Impact Test Bars.** Melvin R. Myerson and Samuel J. Rosenberg. *Revue de Metallurgie*, v. 55, Apr. 1958, p. 318-322.

Modified end-quench procedure for producing uniform microstructure and hardness at notch points. Data on harmful effect of slack quenching on impact properties of some steels. (J26, Q6; ST)

255-J. (German.) **Blank Annealing in Electric Ovens.** O. Meyer-Witting. *Elektrowärme*, Jan. 1958, p. 4-12.
(J23; W27j)

256-J. (German.) **Convention on "Progress in Heat Treatment" in Warsaw, Poland, Oct. 7-8, 1957.** Hildegard Dittschlag. *Maschinenbau - Technik*, Dec. 1957, p. 668-669.
(J-general)

257-J. (German.) **Heat Treatment of Nodular Cast Iron.** J. Motz. *VDI-Berichte*, v. 27 1958, p. 13-18.
13 ref. (J2; CI-r)

258-J. (German.) **Effective Hardening in Gas-Carburized Gear Wheels.** Heinz Glaubitz. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 216-226.
32 ref. (J28g, T7a)

259-J. (German.) **Soft-Nitriding and Sulphidizing—Two New Methods in the Treatment of Geared Parts.** Johannes Mueller. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 235-239.

Bath surface treatment method. 5 ref. (J28k, J2j, T7a; ST)

260-J. (German.) **Surface Hardening of Gear Wheels.** Erich Hoehne. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 241-248.

19 ref. (J2g, T7a)

261-J. (Japanese.) **Diaphragm Made of Extremely Thin Phosphor Bronze Strips.** J. Miyama, T. Ishihara and H. Utsumi. *Engineering Research Institute in Tokyo University, Annual Report*, v. 15, Mar. 1958, p. 89-92.

Heat treatment at 300° C. for 1 hr. is most suitable for 0.03-mm. phosphor bronze diaphragms. Diaphragms treated in this way show minimum dimensional changes and no hysterisis loop. (J-general; Cu-s, *P*, 4-53)

262-J.* (Russian.) **Nitriding Steel Machine Tools to Increase Their Wear Resistance.** E. M. Morozova and F. R. Florensova. *Stanki i Instrument*, v. 29, June 1958, p. 28-31.

Heating with high-frequency current during nitriding as compared to heating in a furnace reduces nitriding time from 24 to 3 hr. Heating to 550° will increase surface hardness. Reduction of nitriding time increases resistance to plastic deformation, decreases tendency toward brittleness. (J28k, 1-69, 2-61, Q-general; TS)

263-J.* (German.) **Salt Bath Carbonitriding.** K. H. Kopietz. *Industrieblatt*, v. 58, June 25, 1958, p. HT45-46, HT47, HT49.

Advantages of carbonitriding; various procedures and resulting surface structures. Distribution of hardness on test pieces of C-15 steel. 7 ref. (J28m; ST)

264-J.* Influence of Heat Treatment on Microstructure and High-Temperature Properties of a Nickel-Base Precipitation-Hardening Alloy. R. F. Decker, John P. Rowe, W. C. Bigelow and J. W. Freeman. *National Advisory Committee for Aeronautics, Technical Note* 4329, 1958, 56 p.

Effect of various heat treatments on the rupture properties and microstructure of a 55Ni-20Cr-15Co-4Mo-3Ti-3Al alloy. Effects of variations in solution treatment, cooling rate after solution treatment, aging treatment on stress-rupture properties at 1600° F. and 25,000 psi. as related to variations in size and distribution of precipitates within the alloy and to residual rolling effects. (J27, M27, Q3; Ni-b, *Cr*, *Co*, *Mo*, *Ti*, *Al*, 2-64, 2-62)

265-J. Structure of Steel. Pt. 6 and 7. Edwin Gregory and Eric N. Simons. *Edgar Allen News*, v. 37, June 1958, p. 130-132.

Tempering, aging and precipitation; microstructure and solidification. (To be continued.) (J-general, M27, N7, N12; ST)

266-J. Expanded Application of Quenched and Tempered Steels. J. M. Hodge and W. T. Lankford. *Engineering Sciences, Technical Paper*, v. 4, no. 5, 1957, 45 p.

9 ref. (J26; J29, 17-57; ST)

267-J. Heat Treatment of Tool Steel. C. Dasarathy. *Indian and Eastern Engineer*, v. 122, Apr. 1958, p. 213-216.

Metallurgical aspects of hardening, tempering and quenching. (J-general; TS)

268-J. Annealing Cycles for Commercial and Drawing Quality Rimmed Steels. Howard E. Miller. *Industrial Heating*, v. 25, July 1958, p. 1369-1370, 1372, 1374, 1376.

Annealing cycles, grain structure and corresponding hardness. (J23; ST-d)

269-J. (German.) **Precipitation Kinetics of Supersaturated Solid Solutions in Copper-Tin Alloys.** Lucja Cieslak. *Bergakademie*, Dec. 1957, p. 616-618.

(J27; Cu, *Sn*)

270-J. (German.) **Determination of Quenching Ability of Hardening Oils. Pt. 1. New Method Based on Measurement of Absorbed Heat.** R. Fischer and O. Schaaber. *Industrieblatt*, v. 58, May 1958, p. HT 35-37.

The interrupted quench method. (J26p, W28p)

271-J. (Japanese.) **Cyclone Furnace Method of Iron Manufacture.** Y. Nokiwa. *Metals*, v. 28, June 1958, p. 448-451.

Advantages and disadvantages. (J-general; CI)

272-J. (Russian.) **Electron Microscope and X-Ray Study of Aging of Al-Ag Alloys.** R. M. Lerinman and N. N. Buinov. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 279-292.

Al alloys with 20% Ag become considerably strengthened in aging process. Comparison of electron microscopic structural changes at different stages of aging process with unchanging anamolous diffraction effects on radiograms shows that the results from both methods of investigation fully correspond. 25 ref. (J27d; *Ag*, Al-b)

273-J.* Protective Gases, Their Production and Application. Gerhard Simon. *AEG Progress*, no. 5, 1957, p. 234-240.

Oxidation of metallic materials during heat treatment can be avoided when carried out in a vacuum, a salt bath or protective atmosphere. The latter, with pure H_2, mixtures of N_2 and H_2 or H_2, N_2, CO and CO_2 with the products NH_3, town gas or propane, attained its highest degree of technical and economic importance after equipment was developed and the production became simple and cheap. Methods of production. Types of furnace for their use. (J2k)

274-J.* (Russian.) **Formation of Nonuniformity in Fusing Zone of Weld.** L. S. Livshits and S. I. Panich. *Svarochnoe Proizvodstvo*, Apr. 1958, p. 22-25.

Heating welds to temperatures of 500 to 700° can produce carbon flow from one part of weld to another and leads to strong chemical and structural nonuniformity in fusing zone. After-heating to 950° will deconcentrate carbon and eliminate nonuniformity. 5 ref. (J-general; ST, 7-51)

275-J. (Book.) **Definitions of Terms Used in the Heat Treatment and Testing of Metals.** 2nd Ed., 88 p., 1957. Australian Institute of Metals, 18 Queen St., Melbourne, C1, Australia.

Chemical, physical and mechanical properties connected with heat treatment. (J-general; 11-67)

K Assembling and Joining

387-K.* Weldability and Notch Toughness. Pt. 1. K. Winterton. *Canadian Metalworking*, v. 21, June 1958, p. 40, 42, 44, 46, 48, 50.

Weld stresses in steel; analysis of defects such as hot cracks, weld-metal cracks, weld-metal fissuring and hardened zone cracks. Typical tests. (K9s; 9-72; ST)

388-K.* Fundamental Steel Metallurgy Applied to Welding. G. B. Craig. *Canadian Metalworking*, v. 21, June 1958, p. 52, 54, 56, 58, 60, 62.

Microstructural changes which occur during welding, effect of alloying elements and the generation of residual stresses can be understood by study of allotropic transformations in pure iron; iron-carbon phase diagram and iron-graphite equilibrium diagram; time-temperature-transformation curves; phase diagrams. (K9n, N8, N6p, Q25h; ST)

389-K.* (English.) **An X-Ray Investigation of Alloy Phases in Soldered Joints.** F. H. Scott. *Cahiers de Physique*, v. 11, Oct-Nov. 1957, p. 370-382.

Use of soldered joints for producing high constraints in ductile metals is found to be limited by alloying and diffusion between the solder and soldered metal. Fracture is found to take place in the intermediate phases of the equilibrium system which form in thin layers at the interface between solder and soldered metal. 7 ref. (K7)

390-K.* (German.) **Welding Method for Circular Seams on Large Pipes.** L. Hense and H. Scheruhn. *Schweissen und Schneiden*, v. 10, May 1958, p. 162-166.

Manual welding of circular seams; electrodes and welding duration; mechanical properties of seams; automatic welding of pipes using a magnetic jig; special electrodes; inspection. (K1; 4-60)

391-K.* (German.) **Study of Weldability of Flame Treated Surfaces.** Hans Schmidt. *Schweissen und Schneiden*, v. 10, May 1958, p. 167-173.

Results of X-ray examination, tensile and notch impact tests, hardness testing, macro and micro-examination of untreated and flame treated sheets. Conclusion was reached that surface protection remained after welding. (K9s, J2h)

392-K.* (German.) **Approximating Equilibrium Conditions in Molten Metal and Slag Pools in Electric Arc Welding. Alumina-Silica Flux as an Example.** William M. Conn. *Schweissen und Schneiden*, v. 10, May 1958, p. 174-180.

Similarity of processes in steelmaking and welding; preparation of welding fluxes for the system Al_2O_3-SiO_2; conditions of experiments with submerged arc welding and results. Considerations on liquidus temperature, formation of molten pools of metal and slag, travel of gas through pool and thermal conditions. (K1; RM-q)

393-K.* (German.) **Oxy-Acetylene Welding of Cast Iron.** Hans Reininger. *Giesserei-Praxis*, v. 76, Apr. 10, 1958, p. 120-123.

Use of welding rod of the approximate same composition as the base metal is suggested, with special attention to the Si content. High quality flux is advised to remove impurities and to prevent surface decarburization. Suitable rod compositions are given. (K2h, W29h)

394-K. How to Prevent Weld Failures in Nuclear Power Piping. V. T. Malcolm and Sidney Low. *Heating, Piping and Air Conditioning*, v. 30, July 1958, p. 106-108.

Welding fabrication techniques for heavy walled piping, with special emphasis on different backup techniques, the necessity of proving the integrity of the root pass, and the importance of heat treatment of welds. (K-general; SS-e, 4-60)

395-K. How Martin Seam Welds Honeycomb Cores. *Industry and Welding*, v. 31, Mar. 1958, p. 56-58.

(K3p, T24a, SS, Ti, Cu, Mo, 7-59)

396-K.* Welding Qualification and Component Performance. W. L. Fleischmann. Digest from "ASME-AWS Joint Metals Engineering Conference Paper 58-MET-8". *Mechanical Engineering*, v. 80, July 1958, p. 82.

Specific weld metallurgical problems as they pertain to the weld heat affected zone, weld deposit, joint design, weld quality and weld quality control. Attempts to show that component performance and weldability tests are interrelated and that, in the context of component performance, weldability tests assume the role of simulated service tests. (K9)

397-K.* Bonding Polyethylene to Rubber, Brass and Brass Plated Metals. H. Peters and W. H. Lockwood. *Plastics*, v. 23, June 1958, p. 228-231.

Bonding is now possible through the use of a cement based on partially hydrogenated polybutadiene known as Hydropol. The polymer, compounded with vulcanizing ingredients, is inserted between polyethylene and brass in the form of a thin film. Application of heat and pressure produces a strong vulcanized bond. (K12; Cu-n, NM-d31)

398-K.* Welding Corrosion-Resisting Steels of the 18/8 Cr/Ni Type and Heat-Resisting Steels. F. A. Ball. *Sheet Metal Industries*, v. 35, July 1958, p. 509-522.

Metallic arc, argon-arc, tungsten-arc, submerged arc and resistance welding of austenitic steels. Typical welding conditions and electrode specifications. 27 ref. (K1a, K1d, K1e, K3; SS)

399-K. Heat Exchangers for Nuclear Power. *Welding and Metal Fabrication*, v. 26, July 1958, p. 234-238.

Welding processes and stress relief of 200-ton pressure vessels. (W13b, K-general)

400-K. Cupro-Nickel Welded With Aluminum Bronze. Vincent Abaravich. *Welding Journal*, v. 37, Mar. 1958, p. 220-224.

Tests show inert-gas consumable-electrode process eliminates weld-deposit cracking. (Kd, 9-72; CU-s, Al)

401-K. An Old Welding Process Cheats the Sea. L. L. Walker, Jr. *Welding Journal*, v. 37, Mar. 1958, p. 225-230.

Oxy-acetylene welding in the reconditioning and rebuilding of magnesium-bronze marine propellers. (K2g, T22h, 17-72; Cu-s, Mg)

402-K.* Ultrasonic Welding of Structural Aluminum Alloys. J. Byron Jones and Florence R. Meyer. *Welding Journal*, v. 37, Mar. 1958, p. 81s-92s.

Ultrasonic spot and seam welding and their possibilities with the aircraft structural Al alloys. Tensile-shear and metallographic studies were made to determine the strength of the welds. Ultrasonics makes surface cleaning less critical and sometimes requires only degreasing. Supplemented with resistance heating, ultrasonic spot-type welders can cover a wider range of metal thickness. 4 ref. (K3n, K3p, 1-74; Al-b)

403-K.* Energy Absorption Studies of Welds in Tempered Martensitic Base Metal. W. H. Bruckner and C. A. Robertson. *Welding Journal*, v. 37, Mar. 1958, p. 97s-100s.

Tempered-martensite base metal provides a larger energy-absorption potential than is available from conventional structural steel of rimmed or killed grades. Tests indicate that the heat affected zone of tempered-martensitic base metal is only slightly lower in energy absorption and ductility than the initial metal. The use of a welded crack stopper of this steel in a rimmed steel would arrest the propagation of a brittle crack since the energy absorbing capacity increases across the weld into the weld interface and into the martensitic base metal. (K9n; ST)

404-K.* Inert-Gas-Shielded Consumable-Electrode Welding of Molybdenum. N. E. Weare, R. E. Monroe and D. C. Martin. *Welding Journal*, v. 37, Mar. 1958, p. 117s-124s.

Arc stability and metal transfer are improved by using d-c, straight polarity, an electrode wire coated with a compound to increase the emission of electrons, and a helium shield. Same conditions produced best weld-bead contour, and lessened weld-metal cracking from shrinkage stresses developed in the weldment. Porosity was eliminated by using either a leading-trailing shield or a dragging shield. Test results indicated that welding process may best be applied to weld thick Mo plate, whereas tungsten-arc welding would be better for welding sheet ⅛ in. thick or less. 7 ref. (K1d, K1g; Mo, 4-53)

405-K.* Spot Welding of Inconel "X" in Thickness Range of 0.032 to 0.188 Inch. Jean Harris, M. D. Bellware and J. J. Riley. *Welding Journal*, v. 37, June 1958, p. 570-578.

Welding schedules for spot welding sheets of Inconel "X". Weld quality meets requirement of MIL-W-6858A specifications. Influence of thickness, welding and forging pressures, weld, quench and temperature times and welding current on weld strength and soundness. Results indicate satisfactory welds can be made on either single phase or three-phase equipment. 4 ref. (K3n, 2-61, 3-74; Ni-b, 4-53)

406-K.* Porosity in Aluminum-Alloy Welds. F. R. Collins. *Welding Journal*, v. 37, June 1958, p. 589-593.

Effects of gas in Al plate, gas in electrode, shielding gas composition and welding conditions on porosity of welds made in Al using inert gas shielded consumable electrodes arc and inert gas shielded tungsten arc processes. Atmospheric contamination of shielded gas during welding was greatest source of porosity in inert gas shielded consumable welds. Excessive gas in plate or electrode contributed to porosity; however, commercial alloy did not contain sufficient gas to substantially effect porosity. Al-Mg alloys gave lower weld porosity than Al-Si alloys. 4 ref. (K9n; Al-b, 9-68)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

407-K.* Electrode-Tip Life Studies in Series Spot Welding. E. F. Nipples, W. F. Savage, S. M. Robelotto and K. E. Dorschu. *Welding Journal,* v. 37, June 1958, p. 241s-248s.

Investigates the effect of electrode geometry, electrode material, electrode force and welding current on weld strength, weld diameter, weld consistency and electrode life for serious spot welds in as-received auto-body stock. Optimum welding condition for cold rolled rimmed steel body stock in pickled and lightly oiled condition of 0.036 to 0.039 in. thicknesses. Welding conditions which do not produce flashing provide more consistent welds than conditions which cause flashing. Consistency of welds made with 2 in. continuous radius dome electrode superior to those with 5/16 in. continuous radius dome electrodes. (K3g, K9r, W29h; ST)

408-K.* Bonding of Cermet-Valve Components to Metals. G. M. Slaughter, P. Patriarca and W. D. Manly. *Welding Journal,* v. 37, June 1958, p. 249s-254s.

Technique and procedures for brazing cermets of the cemented carbide type of Inconel for high-temperature service. Cermets contained varying percentages of titanium carbide, tungsten carbide, tungsten-titanium complex carbide or columbium-tantalum-titanium complex carbide with Ni or Co as binding material; wetting tests with different brazing alloys; microstructure of bonds. Use of Ni for alloy cushions between cermet and Inconel to reduce effects of stresses resulting from differential thermal expansion; high-temperature direct bonding procedure for joining titanium carbide nickel cermets to Ni without brazing alloy. 8 ref. (K8; Ni-b, 6-70)

409-K.* The Arc Welding of Wrought Magnesium-Thorium Alloys. L. F. Lockwood and Paul Klain. *Welding Journal,* v. 37, June 1958, p. 255s-264s.

Results of welding evaluation tests on wrought Mg-base Th-containing alloys. HK31A, HM21XA, HM31XA. Tests with inert gas shielded tungsten arc process indicated alloys possessed excellent weldability and good short-time high-temperature properties after welding. Weld strength closely approached that of base metals at elevated temperatures. Creep resistance was not adversely effected by welding. Post weld heat treatments did not improve weld strength. Corrosion rates in 3% sodium chloride were not changed significantly by welding. EZ33A alloy found to be best rod composition for all alloys except certain applications at temperatures above 600° F. 4 ref. (K1d; Mg, Th)

410-K.* Chlorine Additions for High-Quality Inert-Gas Metal-Arc Welding of Aluminum Alloys. M. B. Kasen and A. R. Pfluger. *Welding Journal,* v. 37, June 1958, p. 269s-276s.

Introduction of small amounts of chlorine into arc area permits radiographically clear flat-position inert gas metal arc welds to be produced in Al alloys containing Mg despite presence of large amounts of gaseous contamination in the arc area. Chlorine introduced in torch contact tube at rate of 10 cubic cm/mm. Effective in preventing porosity and removing dross resulting from oxygen, hydrogen, propane, water vapor hydrated oxide and welding wire contaminations. (K1d; Al, Mg, Cl)

411-K. (Czech.) Welding Technique Development in USSR. Julius Zeke. *Zvaranie,* v. 7, no. 5, May 1958, p. 129-135.

State of automatic welding in USSR as found on study tour of various plants and institutions. (K-general)

412-K.* (Czech.) Investigation of Brazing and Soldering Properties of Fluxes. Viliam Ruza. *Zvaranie,* v. 7, May 1958, p. 141-147.

Considers melting temperature, composition, material to be joined, chemical composition of brazing and soldering fluxes. Flux properties and effect of flux on capillary behavior, wetting power and other properties of brazing alloys; influence of flux on properties of the joint. (K7, K8; RM-q, SGA-f)

413-K. (Czech.) Semi-Automatic Unit for Argon Shielded Welding. Karel Rejchlik. *Zvaranie,* v. 7, May 1958, p. 148-150.

SAP 400 unit for argon shielded arc welding; operating data. (K1d)

414-K. (Czech.) Automatic Welding. Rudolf Krnak. *Zvaranie,* v. 7, May 1958, p. 150-153.

Equipment for increased productivity in submerged arc welding of heavy machinery parts. (K1e)

415-K.* (German.) Metallurgical Problems of Welding Aluminum and Its Alloys With Special Reference to Shielded Arc Welding With Rare Gases. W. Mantel and L. Wolff. *Aluminium,* v. 34, June 1958, p. 320-325.

Considers definition of weldability on basis of position of metal composition in relation to the eutectic; effect of parent and filler metal composition on intergranular weld cracking. Influence of certain impurities and grain refining addition on weldability of pure Al. Al and Al-Mg alloys welded by using filler rods of higher alloy element content. Effect of hydrogen, arc condition and metal constituents on porosity of Sigma welds. 5 ref. (K1d, Al-b)

416-K. (German.) Use of Sigma Welding in Construction of Large Tanks. *Aluminium,* v. 34, June 1958, p. 325-328.

(K1d, T26g; Al-b)

417-K.* (German.) Influence of Surface Treatment on Bonded Metal Joints. H. Peukert and O. Schwarz. *Aluminium,* v. 34, June 1958, p. 329-334.

Chemical pretreatment is preferred to mechanical roughening for surface treatment of Al alloys to be joined with adhesives. Practical importance of pickling process with aqueous solutions of sulphuric acid and sodium dichromate at 60° C. Tests made on steel-steel, copper-copper, brass-brass and mixed bonds to determine effect of surface pretreatment, pickling time, pickling temperature and pickling bath composition on the tension shearing strength of the joints. 6 ref. (K12, L12g; Al-b)

418-K.* Brazing. *Welding Engineer,* v. 43, Aug. 1958, p. 29-38.

Brazing processes, joint designs, fluxes and alloys; properties of Ag brazing alloys. (K8)

419-K.* Selection, Welding of CrMo Alloy Steel Pipe. Pt. 2. Jay Blend. *Welding Engineer,* v. 43, Aug. 1958, p. 42-44, 46.

Effect of preheat and postheat treatments on Cr-Mo alloy steels. (K1; AY-b, 4-60)

420-K.* (Italian.) Autogenous Welding of Cast Iron Parts by Oxy-Acetylene Torch. Bruno Lonati. *Fonderia,* v. 7, May 1958, p. 225-228.

Shop study of repair of defective castings in material of three different chemical analyses. Preheating practice, torch and flame characteristics, filler rods. Hardness and tension tests revealed similarity of repaired and originally sound areas; micro and macrographic tests revealed satisfactory results of repair work with techniques described. (K2h, 18-72; CI)

421-K.* High Strength Weldable Steels. K. J. Irvine. *Metallurgia,* v. 58, July 1958, p. 13-23.

Various ways in which steels can be strengthened and factors influencing weldability; advantages of bainitic structure. 24 ref. (K1, K9s; AY-n)

422-K.* (Czech.) Decrease of Hardness of the Transition Zone in Welds of Low-Alloy Boiler Pipes. Vladimir Smid and Roman Sejnoha. *Zvaranie,* v. 7, June 1958, p. 161-168.

Increased hardness of transition zone in welds of thin-walled pipe; progress of temperature in transition zone during welding; influence of time, temperature and extent of preheating. 5 ref. (K9r, T26q; AY, 4-60)

423-K.* (Russian.) Study of Vibration Effect on Crystallization and Structure of Metal Welded by Flux-Bath Method. F. F. Benua, I. V. Vologdin and A. I. Katler. *Svarochnoe Proizvodstvo,* May 1958, p. 1-5.

Effect of low-frequency vibration (1500 to 2600 cycles per min.) on molten weld metal during period of crystallization. Structure is improved by breaking up large dendrites into smaller ones of varying orientation. Grain size is reduced and ductility improved. 12 ref. (K1e, K9)

424-K.* (Russian.) Some Metallurgical Problems in Welding Aluminum Alloys. A. A. Alov and V. M. Nikitin. *Svarochnoe Proizvodstvo,* June 1958, p. 28-30.

Three fluxes were tested for welding Al-Si—dextran, liquid glass and chlorite. Addition of small amount of chlorite solution to surface of alloy greatly strengthens its adhesion to filler material in seam. Use of sodium will strengthen welds of Al alloys containing $3NaF \cdot AlF_3$. (K-general; Al-b, RM-q)

425-K. Effect of Composition of Iron-Chromium-Carbon Alloys on Weld Hot Cracking Susceptibility. I. K. Pokhodnya. *Avtomaticheskaya Svarka,* v. 9, no. 6, 1956, p. 55-63. (Henry Brutcher, Altadena, Calif., Translation no. 4168.)

Study of Fe-Cr-C alloys containing 0.1-2.5% C and 3-15% Cr. Effect of alloy content and form of eutectic on cracking susceptibility. Beneficial effect of large amounts of eutectic. Applicability of correlation between weld puddle composition and hot cracking resistance to deposition of high-carbon steels alloyed with large quantities of carbide-forming elements such as high speed steels, austenitic manganese steels. (K9r; SS, 7-51, 9-72)

426-K. Furnace Brazing: Quality at Low Cost. H. M. Webber. *Industry and Welding,* v. 31, July 1958, p. 34-35.

Furnace brazing permits use of inexpensive stampings, screw-machine parts and pieces of tubing. (K8j)

427-K. Combine Brazing and Hardening in One Operation. R. E. Wright. *Iron Age,* v. 182, July 31, 1958, p. 80-81.

By combining brazing and hardening steps into a single operation, production is speeded and costs are reduced at General Electric Co. (K8j, J-general)

428-K. Automatic Welding Simplifies Design and Fabrication of High Pressure Cylinder. E. E. Martinac. *Modern Machine Shop,* v. 31, June 1958, p. 148-150.

A butt weld in a 4-in. thick steel cylinder fabricated in the maintenance shop of the Lincoln Electric Co. solved a design problem. (K1e, 17-51; ST)

429-K. Investigation of Residual Stresses Resulting From Submerged Automatic Welding. L. A. Glikman and A. N. Babaev. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 31-37. (Henry Brutcher, Altadena, Calif., Translation no. 4221.)

In the surface layer of axial and tangential welding the residual stresses are in tension. They seem to be about 55 kg. per sq. mm. which roughly corresponds to the elastic limit of the fused metal. In the interior of the weld the stresses are considerably less. Maximum axial stresses are induced by parallel welding and minimum by circular. The greatest tangential stresses are produced by circular and the minimum by longitudinal welding. Preheating at 200° C. is helpful in keeping residual stresses down, but definite improvement is obtained by preheating to about 300° C. (K1e, K9, Q25h; 7-51)

430-K. (German.) **Weldability of Steels for Construction.** K. L. Zeven. *Bauingenieur,* Nov. 1957, p. 420-428.

96 ref. (K9s; ST, SGB-s)

431-K. (German.) **Adhesives for Metals.** E. Pfeil. *Chemie für Labor und Betrieb,* Feb. 1958, p. 65-68. (K12)

432-K. (German.) **Adhesive Joining of Metals.** P. Krekel. *Industrie-Anzeiger,* Apr. 25, 1958, p. 27-28.

14 ref. (K12)

433-K. (German.) **Automatic Arc-Welding.** E. Gatting. *Industrie-Anzeiger,* Apr. 25, 1958, p. 29-30. (K1, 18-74)

434-K. (German.) **Influence of Welding on Modern Design of Boilers and Chemical Equipment.** H. Seifert. *Schweissen und Schneiden,* v. 10, June 1958, p. 197-199. (K-general, 17-51; T29, T26q)

435-K. (German.) **Combined Use of Steel and Copper in the Manufacture of Chemical Equipment.** R. Köcher. *Schweissen und Schneiden,* v. 10, June 1958, p. 206-209.

Welding of an evaporator from Cu-Ni-30Fe and boiler plate HII. (K-general, T29; ST, Cu)

436-K. (German.) **Welded Chemical Equipment Made From Nickel and High-Nickel Alloys.** F. W. Strassburg. *Schweissen und Schneiden,* v. 10, June 1958, p. 209-212. (K-general, T29; Ni)

437-K. (German.) **Welded Fittings Made From Stainless and Acid Resisting Steels.** F. Hüller. *Schweissen und Schneiden,* v. 10, June 1958, p. 213-214. (K-general, T29; SS)

438-K. (German.) **High-Vacuum Tight Welding of Mercury Vapor Rectifiers.** Heinrich Bertels. *Schweissen und Schneiden,* v. 10, June 1958, p. 214-217. (K3p, T1)

439-K. (German.) **Automatic Resistance Welding of a V-Belt Pulley.** A. Weis. *Schweissen und Schneiden,* v. 10, June 1958, p. 219-222. (K3, T7k, 18-74)

440-K. (German.) **Welding in the Motor Car Industry.** E. Dengler. *Schweissen und Schneiden,* v. 10, June 1958, p. 222-223.

Influence of welding on design of the supporting structure. (K-general, T21a)

441-K. (German.) **Semi-Automatic Welding of Longitudinal Seams for Fuel Tanks.** F. Ast. *Schweissen und Schneiden,* v. 10, June 1958, p. 224-226.

Automatic gas welding of thin sheet by interchangeable nozzles to suit the required heat (1.0 to 1.25-mm. sheet thickness); melting of the sheets is independent of melting rate of the filler wire; a gas welding machine described has proved economical for medium quantities. 19 ref. (K2, 1-52; 4-53)

442-K. (German.) **Pressure Gas Welding Process in Reinforced Concrete Construction.** P. Steidl. *Schweissen und Schneiden,* v. 10, June 1958, p. 242-244. (K2k, T26n; ST)

443-K. (German.) **Welding of Nickel and Nickel Alloys.** *Technica,* Dec. 20, 1957, p. 1518-1520. (K-general; Ni)

444-K. (German.) **Welding of Nickel and Nickel Alloys.** *Technica,* Jan. 3, 1958, p. 31-36. (K-general; Ni)

445-K. (German.) **Techniques of Welding, Soldering and Die-Casting.** W. K. Sterling. *Technica,* Jan. 17, 1958, p. 45. (K-general, K7, E13)

446-K. (German.) **Adhesive Joining of Metals.** Norman Adrian de Bruyne. *VDI-Berichte,* v. 28, 1958, p. 87-92.

3 ref. (K12)

447-K. (German.) **Characteristics of Metal Adhesive Joints.** Karl Wellinger and Ulrich Rembold. *VDI-Zeitschrift,* v. 100, Jan. 11, 1958, p. 41-46.

13 ref. (K12)

448-K. (Spanish.) **Welding in Nuclear Plants.** E. B. Lavelle. *Ciencia y Tecnica de la Soldadura,* v. 8, Mar-Apr. 1958, 10 p. (K-general, T11)

449-K. Factors Affecting the Adhesion of Organics. Edmund Thelen. *American Chemical Society, Preprint* 18, Apr. 1958, p. 110-124.

Variables and their effect on strength and premanence of adhesive joints of metals and other solids. Effect of corrosion, surface preparation of metals. 13 ref. (K12)

450-K. Welding Research in the United Kingdom. A. A. Wells and P. T. Houldcroft. *Canadian Metalworking,* v. 21, June 1958, p. 62, 64, 66.

Activities of the British Welding Research Association. (K-general, A9h)

451-K. Salt Bath Brazing. L. B. Rosseau. *Industrial Heating,* v. 25, July 1958, p. 1325-1334, 1346. (K8n, SGA-f)

452-K. New Guide for Good Spotwelds. *Industry and Welding,* v. 31, Aug. 1958, p. 29, 45.

Oscilloscope-type instrument shows pressures and current in welding cycle. Photographic negative of a good weld is superimposed on scope. When weld being done matches pattern on negative, a good weld is assured. (K3n, X25j)

453-K. Spotwelding Titanium Is Practical. W. R. Gain. *Metalworking Production,* v. 102, June 6, 1958, p. 992-994.

Successful welds were made on 6Al-4V Ti alloy. (K3n; Ti-b)

454-K. Pipeline Welding. Pt. 1. Background. Richard D. Morel. *Petroleum Engineer,* v. 30, Apr. 1958, p. D25-D40. (K1d, T26r; ST)

455-K. (Czech.) **Effect of a Vibrating Electrode on Weld Porosity.** Pavel Hrbal. *Zvaranie,* v. 7, June 1958, p. 169-171.

Use of a holder with invariable frequency in electrode welding has no effect on porosity decrease in root welding in difficult positions. (K9r, K1, 9-68)

456-K. (Czech.) **Factors Involved in Argon Shielded Welding With Consumable Electrode.** Pavel Zuffa. *Zvaranie,* v. 7, June 1958, p. 179-180.

Dependence of current on rate of wire feeding; possibility of raising upper current limit; formula for approximate calculation of the welding current from wire feeding rate. (K1d, K9)

457-K. (Czech.) **Testing Soldering Qualities of Solders.** Viliam Ruza. *Zvaranie,* v. 7, June 1958, p. 181-183.

5 ref. (K7, K8; SGA-f)

458-K. (French.) **Vacuum Welding of Metals.** J. A. Stohr and J. Briola. *Soudage et Techniques Connexes,* v. 12, May-June 1958, p. 165-172.

Welding process recently developed by the Commissariat a l'Energie Atomique, in which use is made of the impact of an electron beam produced by an electron gun to melt the edges of the workpieces. Welding is carried out in a metal enclosure, in a vacuum of 10^{-4} to 10^{-6} mm. of mercury. Process makes it possible to weld highly oxidizable metals (e.g., Zr) or to fabricate high-vacuum-sealed metal containers. (K1d, 1-73)

459-K. (German.) **Inert-Gas-Shielded Arc Welding and Cutting of Aluminum.** W. Linieus. *Industrie-Anzeiger,* v. 80, June 27, 1958. p. 746-749.

8 ref. (K1d, G22h; Al-b)

460-K. (German.) **Soldering and Tinplating Gray Cast Iron Treated by Kolene Method.** Carl Albrecht. *Industrieblatt,* v. 58, May 1958, p. 197-199.

Application, technique, economy. (K7d, L16; CI-n, *Sn*)

461-K. (German.) **Preparation of Gray Cast Iron for Brazing.** K. Falkenmayer. *Konstruktion im Maschinen, Apparate und Gerätebau,* Apr. 1958, p. 151-155.

In the brazing of gray cast iron parts the graphite hinders the spreading of the solder. With the Electro-Kolene method the graphite is eleminated on the cast surface. 9 ref. (K8, L13)

462-K. (German.) **New Regulations for Welded Steel Building Constructions.** G. Bürgermeister and A. Neumann. *Schweissen und Schneiden,* v. 10, May 1958, p. 158-162. (K-general, T26; ST)

463-K. (German.) **Welding Copper.** *Technik und Betrieb,* v. 10, June 1958, p. 89-90. (K-general; Cu)

464-K. (Japanese.) **Welding and Brazing of Stainless Steel.** S. Hanabe. *Metals,* v. 28, June 1958, p. 429-433.

Problems with welding of stainless steel: embrittlement of the weld; occurrence of welding cracks and weld strength at high temperature; heat treatment of the weld; brazing of stainless steel. (K-general, K8; SS)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

465-K. (Russian.) **Electrodes for Welding Austenitic Heat Resistant Pipe Steels.** B. I. Lazarev. *Svarochnoe Proizvodstvo*, May 1958, p. 8-11.

(K1, W29h; SS, 4-60)

466-K. (Russian.) **Modification of Fluxes by Metal and Mineral Additions.** M. R. Shraerman and S. B. Petelina. *Svarochnoe Proizvodstvo*, May 1958, p. 14-16.

(K9; RM-q, AD-q)

467-K. (Russian.) **Automatic Welding of Aluminum by Split Electrode.** F. S. Bugrii. *Svarochnoe Proizvodstvo*, May 1958, p. 27-29.

(K1, W29h; Al-b)

468-K. (Russian.) **Weldability of Heat Resistant Pearlite Steel Rotors.** M. Kh. Shorshorov and V. N. Matkhanov. *Svarochnoe Proizvodstvo*, June 1958, p. 18-23.

It is recommended that welding temperature be kept within range 660-680°. 5 ref.
(K9s, ST, SGA-h)

469-K.* **A Photoelastic Technique for Strain Measurement on the Aluminum Alloy Surfaces.** H. Fessler and D. J. Haines. *British Journal of Applied Physics*, v. 9, July 1958, p. 282-287.

Technique for bonding layers of an epoxy resin on flat Al alloy surfaces. Joints which withstood more than 4% strain were obtained by carefully controlled preparation of the metal and the adhesive. Initial birefringence was avoided by curing the joint without external pressure and by slow cooling after finish curing at 65° C. Different types of reflection polariscopes; strain fringe values for reflecting layer and adhesive estimated.
(K11d; Al-b, NMd-30)

470-K.* **Some Applications of Cold Pressure-Welding.** *Machinery (London)*, v. 93, July 23, 1958, p. 207-213.

Preparation of the mating surfaces and of four different types of lap-welded joint, also of manually and pneumatically operated tools available for this process. (K6)

471-K.* (Russian.) **Effect of Welding Conditions on Hydrogen Content of Weld Metal.** R. A. Kozlov. *Svarochnoe Proizvodstvo*, Apr. 1958, p. 25-28.

Study of hydrogen in metal which causes cracks and other flows in welding process. In automatic welding, content of hydrogen in weld metal depends on welding procedure, type of current and grade of flux and temperature of annealing. In manual welding, the temperature for firing the electrode is basic factor influencing the lowering of hydrogen content in the fused metal. 5 ref. (K1, 2-61, 2-64; H, 7-51, 9-72)

472-K.* **New Concept Solves Aluminized Pipe Weld Problems.** Kenneth R. Notvest. *Petroleum Refiner*, v. 37, July 1958, p. 100-102.

Inert gas welding controlling the fusion of aluminized base metal with the filler metal to give an alloyed root pass, which is fused to the base metal coating, provides continuous protection from corrosion of Al.
(K1e, 4-61, 8-74)

473-K.* (German.) **Experience With Argon Protected Sigma Hard Facing and in Carbon Dioxide Joint Welding.** R. Nass and E. Brammertz. *Werkstatt und Betrieb*, v. 91, June 1958, p. 297-305.

Apparatus, technique and results in facing sheet steel with Cu alloy under argon protection and in welding thick sheet under carbon dioxide protection. Acceptance testing in carbon dioxide sigma welding applied to boiler construction. Investigation on toxic effect of carbon dioxide. 4 ref. (K1d, L24; ST, 4-53)

474-K.* (German.) **Ultrasonic Welding.** W. Weber. *Werkstatt und Betrieb*, v. 91, June 1958, p. 305-310.

Principle; comparison with high pressure welding; best modern construction of weld units; controlled operation variables; recrystallization welding; mechanism of ultrasonic welding; thermal conditions in weld zone; properties of welded material; applications. 10 ref. (K6r)

475-K.* (German.) **Effect of Hydrogen in Steel Hardening and Welding.** K. L. Zeyen. *Werkstatt und Betrieb*, v. 91, June 1958, p. 310-320.

Effect of hydrogen in hardening and methods to measure it; effect of hydrogen in welding; effect of humidity of electrode coats and of welding method. Recent publications on basic coated electrodes and advantages of the latter. 100 ref. (K1, ST; 9-72, 10-54)

476-K.* (German.) **New Method of Arc Butt Welding of Rails.** Ott and Krause. *Schweisstechnik*, v. 12, May 1958, p. 51-58.

Development and technique of method; quality of weld; economical advantages; testing and mechanical properties of weld. (K1, T23q)

477-K. Grit and Shot-Reinforced High-Tensile Bolted Joints. R. L. Sanks and C. C. Rampton, Jr. *American Society of Civil Engineers, Proceedings*, v. 83, Nov. 1957, 32 p. (National Advisory Committee for Aeronautics Technical Note 1435.)

Paint in high tensile bolted joints drastically reduces frictonal resistance to slip. Shot-reinforced painted joints are, in static tests, equal to or somewhat better than clean mill-scale joints, and much superior to riveted joints. (K13p)

478-K. High-Temperature Corrosion-Resistance Brazing. John V. Long and George D. Cremer. *Astronautics*, v. 3, Aug. 1958, p. 28-29.

(K8)

479-K. Soldering in the Space Age. Alvin B. Kaufman. *Instruments and Automation*, v. 32, July 1958, p. 1202-1203.

Factors governing joint strength.
(K7)

480-K. Electrical Resistance Welding. D. S. Faulkner. *Wire Industry*, v. 25, July 1958, p. 643-645, 647-648.

Problems associated with continuous wire drawing, especially the flash welding and butt welding of rods to be drawn. Proposal for automated wire drawing factory.
(K3r, W28h; 4-55, 4-61)

481-K. (German.) **Welding in Steel-Casting Foundries.** Otto Bergmann and Helmut Reichert. *Giessereitechnik*, v. 4, May 1958, p. 110-111.

(K-general, W19; ST, 5-60)

482-K. (German.) **Status of the Technology of Arc Welding Steel.** Theodor Ricken. *Industrieblatt*, v. 58, June 25, 1958, p. 246-250.

Submerged arc, inert arc and electroslag welding. 4 ref. (K-general)

483-K. (German.) **Metallurgical Requirements for Welding Clad Steel Plates.** W. Rädeker. *Schweissen und Schneiden*, v. 10, July 1958, p. 255-259.

Improving resistance against transcrystalline cracking in the welds; heat treatment of welds.
(K9, J-general; ST, 7-51, 8-66, 9-72)

484-K. (German.) **Selected Examples of Welded Structures in Chemical Engineering.** Rudolf Söhngen. *Schweissen und Schneiden*, v. 10, July 1958, p. 260-265.

Influence of welding upon design of plant and equipment; properties and position of the welded seam; design elements; examples in steel, copper and alloys.
(K-general, T29, 17-51; ST, Cu)

485-K. (German.) **Welding in Apparatus Construction for the Chemical Industry.** P. Richter. *Schweissen und Schneiden*, v. 10, July 1958, p. 265-269.

Design; welding pipes; welded boiler connections; hard facing of small parts; re-inforcement welding on vessels.
(K-general, T29, T26r, T26q, 17-51)

486-K. (German.) **Design of Welded Vessels for High Pressures and Temperatures.** A. F. Maier. *Schweissen und Schneiden*, v. 10, July 1958, p. 270-276.

Stress of walls; deformation as a function of distribution of stress; multilayer hollow bodies; mechanics of the casing tubes. 12 ref.
(K-general, T29; ST, 4-60)

487-K. (German.) **Welding of Pressure Vessel Steels in Heavy Sections by the Electro-Slag Process.** W. Anders. *Schweisstechnik*, v. 12, June 1958, p. 65-70.

9 ref. (K1d, K3p, T26q; ST)

488-K. (German.) **Welding of Alloy-Steels in the Chemical Industry Without Pre-Heating.** Werner Gilde. *Schweisstechnik*, v. 12, June 1958, p. 84-87.

Slow cooling to hold the temperature of the weld zone for a brief time at the solidification temperature. 8 ref. (K9q, K9r; ST)

489-K. (German.) **Automatic Submerged-Arc Welding of Thin Plates.** Horst Buszka. *Schweisstechnik*, v. 12, June 1958, p. 87-91.

Mechanical properties of joints; description of equipment.
(K1e, 3-73, 18-74; ST, 4-5)

490-K. (Russian.) **Stresses in Thin Sheet Elements in Welding and How to Avoid Them.** S. A. Kurkin and V. A. Vinokurov. *Svarochnoe Proizvodstvo*, Apr. 1958, p. 28-31.

Recommends rolling of ring-shaped seams and pressure on spots in spot welding to eliminate stresses. 5 ref.
(K3n, Q25h, 3-74, 17-51; 4-53, 7-51)

Cleaning Coating and Finishing

563-L. Vacuum Metallizing. *Pacific Factory*, v. 89, Mar. 1958, p. 32-34.

Widening application to products where good abrasion resistance is called for, such as automotive hardware, drawer pulls and plumbing fixtures. (L23, 1-73)

564-L. Bright Nickel Plating. A. M. Ozerov. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 61-69. (Translation by Consultants Bureau, Inc.)

In the electrodeposition of Ni by different types of electric current, use of alternating current is advantageous. Hypothesis to explain the formation of smooth, bright Ni coatings of low porosity by use of a pulsating current periodically varying in magnitude, and of an alternating current with an anodic component. 18 ref. (L17b; *Ni*)

565-L.* (Italian.) **Vitreous Enameling of Aluminum.** *Alluminio,* v. 27, Apr. 1958, p. 189-196.

Properties and applications of enameled Al; process details. 13 ref. (L27; Al)

566-L.* (Italian.) **Bright Silver Plating.** *Galvanotecnica,* v. 9, Mar. 1958, p. 63-71.

Types of baths, brighteners; chemistry of plating process; sequence of operations; effect of variables such as current density, pH and bath composition on brightness and hardness of deposits. 42 ref. (L17; *Ag*)

567-L.* New Technique Rids Plated Steel of Hydrogen Embrittlement. H. H. Johnson, E. J. Schneider and A. R. Troiano. *Iron Age,* v. 182, July 31, 1958, p. 47-50.

An initial very thin plate of Cd is deposited on the metal; the piece is baked for a short time to drive off hydrogen; plated again to bring thickness to desired level. Initial plating prevents further hydrogen embrittlement. (L17c, Q26s; ST, Cd)

568-L.* (German.) **Dip Titanium Coatings on Iron.** M. E. Straumanis and Y. P. Huang. *Metall,* v. 12, June 1958, p. 501-503.

Titanium coatings on iron are extremely corrosion resistant, except for the pores left in the coating. To find the pores, an NaCl solution was used, resulting in yellow spots on the surface. The pores can be eliminated entirely through light scraping and subsequent treatment with an $AgNO_3$ solution. Of ten specimens thus treated eight proved to be corrosion resistant. 6 ref. (L16, 9-68; Fe, Ti)

569-L.* (German.) **Practical Applications for Bohmite Coatings.** D. Altenpohl. *Metall,* v. 12, June 1958, p. 503-507.

Bohmite is a gamma AlO OH crystallized aluminum oxydehydrate. It develops when Al reacts with water or vapor at about 75° C. and forms a strongly adhesive coating about 0.2 to 2 microns thick, which is corrosion resistant. This process is recommended for kitchenware and wrappings as well as for containers and pipes. Additions of ammonia or triaethanol-amine accelerate the coating process. Apparatus for this process is described and tables and diagrams are given for thickness of coating, growth rate and applications. 16 ref. (L21; Al-b)

570-L.* (German.) **Chemical and Electrochemical Surface Treatment of Molybdenum and Tungsten.** H. J. Boosz. *Metall,* v. 12, June 1958, p. 508-511.

A survey of the literature covering chemical etching and polishing, electrochemical potential, electrolytic etching and polishing, electroplating from aqueous solutions and from melts, electroplating with Cu, Au, Ni and Cr. 63 ref. (L-general; Mo, W)

571-L.* (German.) **Applications of Precious Metal Coatings.** H. W. Dettner. *Metall,* v. 12, June 1958, p. 520-522.

Precious metals, especially Au and Ag, are used increasingly as electroplate for electrical purposes. The electric conductivity of Ag is excellent. A special electrolytic passivating process was developed for Ag to prevent oxidation under H_2S. Au is not as conductive but is more corrosion resistant. The softness of Au was compensated through hard Au deposits at room temperature which are also more wear resistant. Rhodium coatings on Ag increase heat resistance. 8 ref. (L17; Ag, Au)

572-L.* (Spanish.) **Metallization of a Hydraulic Press Cylinder.** Arnulfo Espinosa. *Fusion de Metales,* v. 20, Mar-Apr. 1958, p. 21-23.

Inside walls of press required to support 600 tons pressure were rust protected by application of ¼-in. bronze coating. (L23, W24g; Cu-s)

573-L.* Nitric Acid Cleaning of Sensitized Type 304 Stainless Steel. R. G. Christman. *Bettis Technical Review,* WAPD-BT-7, Mar. 1958, p. 121-123.

Cleaning of sensitized Type-304 stainless steels with 25% HNO_3 at 150° F. for as long as 16 hr. has no adverse effects. Care must be exercized to avoid residual acid deposits. (L12g; SS-b)

574-L. Prepaint Conditioning for Aluminum Die Castings. John C. Ruttle. *Die Casting Engineer,* v. 2, Mar. 1958, p. 14.

(L26n, 5-61; Al)

575-L.* Surface Finishing by Vacuum Metallizing. Balram K. Mahendra. *Indian and Eastern Engineer,* v. 122, Apr. 1958, p. 271, 273-275, 277.

Applications vary widely such as obtaining economical decorative finish three-dimensional effect of true metallic inserts, infinitesimal thickness coatings for precise fidelity, highly reflective, partly reflective, opaque or fully nonreflective surfaces, metallized coating on non-conductors, improved conductivity of substances and others. Characteristics of various coatings such as Al, Au, Ag, Pt, W, Ta, Mo, Ni, Cr are considered. (L23, 1-73)

576-L. The Surface Treatment of Magnesium Castings by the Fluoride Anodizing Process. J. K. Wilson and F. D. Waldron-Trowman. *Light Metals,* v. 21, June 1958, p. 186-188.

Process affects decontamination of undesirable metals on surface; provides for detection of outcropping oxide skins for flux inclusions. (L19; Mg-b, 5-60)

577-L. Phosphating Treatments. Pt. 4. Ervin C. Tinsley. *Metal Finishing,* v. 54, July 1958, p. 66-69, 73.

Brief summaries of 103 U. S. patents. (L14b)

578-L.* Finishing Die Castings. Pt. 5. Chromate Conversion Treatments. Raymond Stricklen. *Precision Metal Molding,* v. 16, June 1958, p. 43-45.

Cleaning, chromate treatment and post treatments to produce chromate conversion coatings on Al, Mg, Cu, Zn and brass die castings. (L14e; Al, Cu, Cu-n, Zn)

579-L. Special Finishes—and Their Uses. Pt. 1. B. M. Letsky. *Product Finishing,* v. 11, June 1958, p. 54-62.

Formulation and uses of hammer, opalescent, leather, hardboard, polyester, and stoving hardboard finishes. (L-general)

580-L. Finishing Facilities for a Modern Railroad. *Product Finishing,* v. 22, Mar. 1958, p. 24-35.

(L17a, T23, L26n, 18-67; Cr, Ag)

581-L. Electrochemistry and the Plater. Pt. 3. Fred G. Brune. *Product Finishing,* v. 22, Mar. 1958, p. 36-42.

(L17b, A3h; Zn, Ni, Cu)

582-L. Continuous Galvanizing by the Armco-Sendzimir Process. I. C. Gwynne. *Sheet Metal Industries,* v. 35, July 1958, p. 497-506, 534.

Description of new line installed at Ebbw Vale Works of Richard Thomas and Baldwins Ltd. (L16; ST, Zn)

583-L. Metallizing and Its Application in Aircraft Gas-Turbine Components. Donald E. Hacker. *Welding Journal,* v. 37, Mar. 1958, p. 231-236.

(L23, T24b, Mo)

584-L. Steel Pickling: When Should It Be Used? *Western Metalworking,* v. 16, Mar. 1958, p. 58-60.

(L12g, ST)

585-L. Dimensional Changes of Aluminum Alloy Articles in Anodic Oxidation. A. V. Shreider. *Journal of Applied Chemistry of the USSR.* v. 30, 1957, p. 83-93. (Translation by Consultants Bureau, Inc.)

Nature of the dimensional changes is determined by the anodizing conditions and chemical composition and structure of the metal. Dimensional changes are strongly influenced by the method of preparing the surface before anodizing and by the configuration of the anodized articles. For minimum dimensional changes in anodizing for corrosion protection of precision parts, the surface should be prepared by the use of organic solvents (and not alkaline solutions), and the anodic oxidation should be carried out in 3% CrO_3 solution at 34-42°, at 40 v. for 45-60 min. 61 ref. (L19p, P10d; Al-b)

586-L. Electrochemical Tinning of Sheet Iron From Halide Solutions. V. P. Kochergin, T. A. Nimvitskaya and M. Ya. Vyunova. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 95-100. (Translation by Consultants Bureau, Inc.)

An increase of the cathode polarization in electrodeposition of Sn from solutions of simple Sn salts can be effected by addition of complex-forming inorganic compounds. The fluorides of ammonium and sodium act as such complex forms in halide solutions. (L17a; Sn, Fe, 4-53)

587-L. Dependence of the Anode Potential of Steel on the Electrolyte Composition in Electrochemical Polishing. N. P. Fedotyev and S. Ya. Grilikhes. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 239-244. (Translation by Consultants Bureau, Inc.)

(L13p; ST)

588-L. Electrochemical Liberation of Zinc on Aluminum Cathodes With Differently Treated Surfaces. D. P. Zosimovich and T. I. Kononchuk. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 245-253. (Translation by Consultants Bureau, Inc.)

Principal factor determining adhesion of Zn to Al is absence or presence of an oxide film on the Al surface. When an Al cathode is immersed in an electrolyte containing fluoride ions, the oxide film on the electrode surface is attacked and Zn is deposited on it. While the film remains thick, the metals will not adhere. Different states of the oxide film on the Al surface and different fluoride-ion contents lead to different rates at which the film is dissolved, and hence to differences in adhesion between the metals. 35 ref. (L17; Al, Zn)

589-L. Electrolytic Copper Plating From Ammoniacal Electrolyte for Local Protection of the Surface of Steel

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

Articles in the Cementation (Carburization) Process. N. A. Marchenko. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 255-260. (Translation by Consultants Bureau, Inc.)

Ammoniacal electrolytes can be successfully used for direct Cu plating of steel parts for local protection of the surface against carburization. Operating conditions; room temperature, cathode current density 2-3 amp/dm^2, anode current density with soluble Cu anodes 2-3 amp/dm^2. 6 ref. (L17a; Cu, ST)

590-L.* (Italian.) **Coloring of Anodized Aluminum.** C. Pieri. *Alluminio*, v. 27, June 1958, p. 267-271.

Coloring of anodic coatings with synthetic coloring matter depends primarily on physical absorption phenomena which occur between electropositive Al oxide and electronegative coloring substance. In some cases (e.g., Al lacquers with phenolic colorants), chemical phenomena will also be present. General characteristics which colorants should have for different applications. (L19q; Al-b)

591-L.* (Italian.) **Painting of Light Alloys Used in Naval Construction.** R. Ferrero. *Alluminio*, v. 27, June 1958, p. 273-275.

Electrochemical corrosion of light alloys used in ship building; required characteristics of protective paints; resin-base paints which have given excellent results in actual use. (L26, R4b; Al-b, Mg-b)

592-L.* (Italian.) **Pretreatment of Metal Surfaces Prior to Painting.** *Pitture e Vernici*, v. 14, Mar. 1958, p. 233-236.

Mechanical, physical, chemical and ultrasonic methods of surface preparation. (L10, L12)

593-L.* (Spanish.) **Experimental Study of a New Metal-Coating Process. Continuous Semi-Industrial Installation for Aluminum Coating of Iron Wire by Immersion in a Fused Electrolyte.** Manuel Serra. *Revista de Ciencia Aplicada*, v. 12, May-June, 1958, p. 222-237.

Solutions were worked out to mechanical, metallurgical and chemical problems common to all immersion coating processes. For each bath composition a critical operating temperature was observed which coincides with temperature at which minimum thickness of intermetallic sub-layer is formed. Baths containing Cr, Mo and Be together provided coatings of best ductility, brightness and uniformity of surface. 9 ref. (L16; Fe, Al, 4-61)

594-L.* **The Influence of Aluminum, Lead and Iron on the Structure and Properties of Galvanized Coatings.** J. J. Sebisty and J. O. Edwards. *Mines Branch Research Report R5, Department of Mines and Technical Services, Ottawa*, Mar. 14, 1958, p. 1-47.

Immersion time and Al content of the bath had the most significant effect on such factors as coating weight, steel weight loss, iron content and alloy growth in the coating, and ductility and adherence of the coating. The bath temperature was also significant but to a lesser degree. The lead content of the bath was the most significant variable affecting coating appearance. (L16, 2-60; ST, *Al, Pb, Zn)*

595-L.* (Russian.) **Electrolytic Polishing of Machine Parts.** V. A. Zhikh. *Vestnik Mashinostroeniya*, v. 38, June 1958, p. 58-60.

New metal finishing method by use of electrolytes with direct current. Electrolytes consist of concentrated acids, usually sulphuric acid. The workpiece serves as anode and insoluble lead rod serves as cathode. 5 ref. (L13p)

596-L. Descaling and Cleaning of Titanium and Titanium Alloys. D. W. Stough. Battelle Memorial Institute (Office of Assistant Secretary of Defense), *U. S. Office of Technical Services*, PB 121640, Mar. 1958, 68 p. $1.75.

Acid pickle baths are generally used to remove scales formed at temperatures up to about 1100° F. Above this more drastic treatment is needed, such as molten salt treatment followed by acid pickling. Proprietary descaling methods, and descaling practices at the major producers of mill products. (L12g, L12h; Ti-b)

597-L. Automatic Hard Surfacing of Complex Curves. *Industry and Welding*, v. 31, July 1958, p. 37.

New automatic machine cuts manhours 40% and surfaces better, faster and more uniformly. Sampling, rework and distortion are reduced. A twin-arc oscillating welding head was mounted on a radial manipulator. (L24, 1-52)

598-L. Conveyor Allows Random Choice of Anodizing Treatment. Robert Nyquist. *Iron Age*, v. 182, July 31, 1958, p. 51-53.

Use of projections on anodizing racks and trip switches at appropriate steps in the cycle permits automatic selection or skipping of any desired step. (L19, W3g, 1-52)

599-L. American Can Opens Coil Stock Plant in Hammond, Ind. *Iron and Steel Engineer*, v. 35, July 1958, p. 142-143.

World's first plant devoted exclusively to processing tin and steel plate from coils for manufacture of metal cans will perform two basic functions—chemical coating of steel plate (black plate) for use in "tinless" cans, and shearing of huge coils of both tin plate and chemically treated plate into can-making sheets. (L16, 1-52, F29q, ST, *Sn*, 4-53)

600-L. Barrel Plating Is Finding Its Place. D. J. Fishlock. *Metalworking Production*, June 27, 1958, p. 1115-1121.

Suitability of work for barrelling depends on skill of the plater, and availability of a variety of work which can be mixed to give suitable loads. A certain amount of burnishing must be expected and angular parts may become appreciably eroded. Uniformity is less satisfactory than in vat plating. (L17)

601-L. Protection of Springs Made of Steel No. EI 723 Against Oxidation at High Temperatures. T. I. Volkova and Yu. N. Griboedov. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 37-40. (Henry Brutcher, Altadena, Calif., Translation no. 4222.)

Flat springs made of this steel are recommended for labyrinth packings in steam turbines. They functioned well up to 550° C., but beginning at 500° C. they became covered with scale. Various metallic glazes were tried and best results were obtained from a mixture of 60% metallic chromium, 39% alumina and 1% ammonium iodide. (L27, R1h, 2-62; ST)

602-L. Aluminum Coating of Iron by Vaporized Aluminum Chloride. S. A. Semenkovich and A. V. Smirnov. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 48-51. (Henry Brutcher, Altadena, Calif., Translation no. 4225.)

Corrosion resistance of mechanical parts may be considerably increased by treatment with monohalogens of Al. Under action of vaporized aluminum chloride a hard, heat resistant coating is formed on iron surfaces at 950 to 1000° C. Apparently an intermetallic compound, Fe_2Al, is formed. At higher temperatures the coating becomes softer and probably is made up of the eutectic mixture of Fe_2Al_5 and $FeAl_3$. 12 ref. (L25; Fe, *Al*)

603-L. (English.) **Effect of Cyanide on Electrodeposition of Copper-Tin Alloys.** Salah E. S. El Wakkad and Hassan Sabry. *Egyptian Academy of Sciences, Proceedings*, v. 12, 1956, p. 1-5.

10 ref. (L12d; Cu-b, Sn-b)

604-L. (French.) **Protection of Steel Parts Used in Building Construction.** P. Blancheteau. *Corrosion et Anticorrosion*, v. 6, June 1958, p. 191-202.

Steel parts used as construction elements can have a life comparable with that of other materials if suitable care is taken to protect them against corrosion. Protective properties of paints, varnishes, metal coatings, vitreous enamels and other preparations; prior mechanical and chemical treatment of the surfaces. (L-general; ST, SGB-s)

605-L. (French.) **Development of Modern Techniques of Hot Tin Plating in Industry.** W. E. Hoare. *Métaux Corrosion-Industries*, Apr. 1958, p. 184-188.

(L16; Sn)

606-L.* (German.) **Viscosity of Various Flux Melts for Hot Dip Processes in Zinc, Tin and Lead.** Joseph Hille and Wolfgang Durrwachter. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 269-274.

Dynamic viscosities of various flux materials, such as zinc chloride, alkaline systems, ammonium chloride and ammine-type systems. Addition of alkali halides or ammonium chloride decreased the viscosity of zinc chloride. Oxides increased viscosity after saturation of the homogeneous solution. With iron oxide the degree of oxidation is of particular influence. Diagrams for viscosities given. 14 ref. (L16, P10f; RM-q, Zn, Sn, Pb)

607-L. (German.) **Investigations on the Formation of Protective Coatings During Cathodic Polarization of Steel Surfaces.** Heinrich Klas. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 321-328.

Formation of protective coatings from $CaCO_3$ and $Mg(OH)_2$ on steel parts through cathodic polarization and their properties in diluted and undiluted ocean water, in acid and acid-free drinking water and in earth-type solutions. Current density-time diagrams and resistance-time diagram. Debye-Scherer photographs were taken, with $Mg(OH)_2$ and $CaCO_3$ as calibrating substances. Recommendations for correct polarization and protective potentials. (L21; ST)

608-L. (German.) **Protection Against Corrosion by Means of Coal-Tar Pitch Applied by the Colarit Flame Spray Method in Turkey.** Harald Stern. *Bau, Maschine und Technik*, Jan. 1958, p. 17-19.

(L26a)

609-L. (German.) **Varnish Fights Corrosion Successfully.** Ingo Latzem.

Chemische Rundschau, Mar. 1, 1958, p. 114-118.
(L26n)

610-L. (German.) **Synthetics as Protective Coatings.** *Deutsche Farbenzeitschrift*, Mar. 1958, p. 87-88.
(L26p)

611-L. (German.) **Silicones as Agents for Surface Refinement and Impregnating.** W. Noll. *Deutsche Farbenzeitschrift*, Mar. 1958, p. 90-92.
(L26p; NM-a37)

612-L. (German.) **Significance of Pigments in Coloring and Protection Against Corrosion.** J. D'Ans and H. J. Schuster. *Farbe und Lack*, Feb. 1958, p. 73-77.
Corrosion prevention with red lead oxide and zinc powder. (L26n)

613-L. (German.) **Preliminary Treatment of Metal Surfaces for Finishing.** H. Kohlhase. *Feingeraete-Technik*, no. 1, 1958, p. 38.
Staining, sandblasting, phosphating. (L10c, L14b)

614-L. (German.) **Preliminary Treatment of Metal Surfaces for Finishing.** H. Kohlhase. *Feingeraete-Technik*, no. 2, 1958, p. 86-90.
Chemical and electrolytic oxidation of Al. 14 ref. (L12, L13n; Al-b)

615-L. (German.) **High-Vacuum Vaporizing Equipment in the Metallization of Synthetics.** W. D. Nassauer. *Kunststoffe*, Apr. 1958, p. 166.
(L23; NM-d)

616-L. (German.) **New Techniques of Varnishing.** Fr. Stein. *Maschinenbau*, Dec. 1957, p. 353-354.
6 ref. (L26n)

617-L. (German.) **Microfinishing by Pressure Polishing.** K. Ahlgrimm. *Maschinenbau*, Apr. 1958, p. 102-103.
(L10b, 3-74)

618-L. (German.) **Behavior of Various Nickel Anodes in Electrolytic Nickel Baths.** E. Raub and A. Disam. *Metalloberfläche*, v. 12, June 1958, p. 161-167.
Microscope observations of various Ni anodes. Curves of anode potential versus current density. Sludge formation. (L17, W3h; Ni)

619-L. (English.) **Protection of Steel by Painting.** J. C. Hudson. *Schweizer Archiv*, Feb. 1958, p. 46-56.
19 ref. (L26n; ST)

620-L. (German.) **White Enameling Directly on Steel.** Arnim Petzold and Helmut Betzer. *Sprechsaal für Keramik, Glas, Email*, no. 2, 1958, p. 26-29.
(L27; ST)

621-L. (German.) **White Enameling Directly on Steel.** Arnim Petzold. *Sprechsaal für Keramik, Glas, Email*, no. 4, 1958, p. 71-73.
Preparation of steel for enameling. 6 ref. (L27, L12; ST; 4-53)

622-L. (German.) **Defects in Enameled Castings.** A. Thuermer. *Sprechsaal für Keramik, Glas, Email*, no. 9, 1958, p. 203-204.
3 ref. (L27, 5-60, 9-71)

623-L. (German.) **Majolica Enamels for Cast Iron From 1930-1958.** W. Heller. *Sprechsaal für Keramik, Glas, Email*, no. 9, 1958, p. 205.
(L27; CI)

624-L. (German.) **White Enameling Directly on Steel.** Arnim Petzold. *Sprechsaal für Keramik, Glas, Email*, no. 9, 1958, p. 205-207.
9 ref. (L27; ST)

625-L. (German.) **Modern Degreasing of Metal.** Dieter Jaenecke. *Vakuum-Technik*, Apr. 1958, p. 52-55.
(L12)

626-L. (German.) **Ultrasonic Cleaning and Degreasing.** H. Faehse. *VDI-Zeitschrift*, v. 100, Jan. 21, 1958, p. 92-93.
(L10f)

627-L. (German.) **Scouring of Large Gear Wheels.** Otto Ufert and Hugo Junklewitz. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 209-215.
(L12, T7a)

628-L* (Italian.) **Painting of Aluminum Exposed to Marine Atmosphere.** G. Luft. *Alluminio*, v. 27, Mar. 1958, p. 107-118.
Specimens of Al-Cu-Mg and Al-Mg alloys used in naval construction were given various types of anticorrosion paint treatments to determine deformability, adherence, impermeability and physico-chemical stability of applied coatings. Detailed observations based on natural corrosion and accelerated corrosion tests are reported. Phosphate coating followed by undercoating of zinc chromate, polyvinylchloride paint was found to constitute best pretreatment prior to finish painting. 8 ref. (L26n, R3p; Al, *Cu, Mg*)

629-L. (Japanese.) **Finishing Metal Plates With Sand Slurries.** Sakaji Yamasita. *Japan Society of Mechanical Engineers, Transactions*, v. 24, May 1958, p. 302-306.
The working direction of the surface is set at an angle of 90° to the flow of the sand particles. Finishes are bastard file, dead smooth file, emery paper and buff. (L10c)

630-L. (Japanese.) **Study on Current Efficiency of Chloroplatinic Acid Plating.** N. Awa and Y. Yamamoto. *Research Institute of Technology, Nihon University, Journal*, v. 16, Dec. 1957, p. 268-271.
Current efficiency of the cathode in plating for 1 min. in each of eight kinds of plating solutions.
(L17a)

631-L.* (Rumanian.) **Chemical Polishing of Aluminum and Its Alloys.** E. G. Popescu. *Industria Usuoara*, v. 5, Apr. 1958, p. 145-148.
Mechanism of chemical polishing; types of baths; influence of composition and structure of metal on successful polishing; equipment. 8 ref. (L12; Al)

632-L.* **Effect of Addition Agents on the Electrodeposition Stress of Nickel.** Hideo Ise. *Electrochemical Society of Japan, Journal*, v. 26, 1958, p. E18-E20.
Effects of various current densities, p-toulene sulphonamide as stress reducer, methylquinoline chloride as subbrightener, benzylnaphthalene sodium sulphonate as brightener, and sodium lauryl sulphate as antipitting agent.
(L17a, L17c, Q25k; Cu, Ni)

633-L. **Application of Cermet Coatings.** *Australasian Manufacturer*, v. 42, Mar. 1, 1958, p. 66-69.
Cermet powder, a Cr-B-Ni mixture, is combined with ceramic frit and applied to a metal base to provide hard, high-temperature resistant facing for metal parts.
(L27; ST, Cr, Ni, B, 6-70)

634-L. **Rhodium Plating Techniques.** R. R. Benham and I. J. Warwick. *British Communications and Electronics*, v. 5, Apr. 1958, p. 266-269.
(L17; *Rh*)

635-L. **Developments in Hard Anodising of Aluminum.** Joseph E. Trankla. *Light Metals*, v. 21, July 1958, p. 218-219.
(L19; Al-b)

636-L. **Chemical Surface Protection of Light Metals.** A. Pollack. *Metal Treatment and Drop Forging*, v. 25, June 1958, p. 236-238. (From *Metall*, Sept. 1957, p. 754-756.)
Previously abstracted from original. See item 25-L, 1958.
(L14; Al, Mg)

637-L. **Plating With Ultrasound.** Harry A. Reich. *Pacific Factory*, v. 89, Mar. 1958, p. 30, 46.
Ultrasound plating makes possible reduction of time, avoidance of common coating defects and processing of normally inaccessible, rusty and greasy parts. (L29, 1-74)

638-L. **Bright Nickel Plating. Pt. 5. Brightening Agents.** D. J. Fishlock. *Product Finishing*, v. 11, June 1958, p. 65-75.
Present state of knowledge on brighteners and brightening action. Types of brightening agents and mechanisms of nickel plating. 20 ref. (L17a; *Ni*)

639-L. **The Production of Pre-Painted Strip.** *Product Finishing*, v. 11, June 1958, p. 76-80.
General layout of Coated Strip Ltd. plant. Treatment of the strip; its applications in manufacturing. (L26; 18-67, 4-53, ST)

640-L. **Electroplating Explained. A Course for the Working Plater. Pt. 4. Water and Aqueous Solutions.** H. Hartley. *Product Finishing*, v. 11, June, 1958, p. 99-103, 120.
(L17)

641-L. **Chromized Steel. A New Low Cost, Heat, Wear or Corrosion Resistant Material.** Richard P. Seelig. *Society of Automotive Engineers, Preprint, 30B*, Mar. 1958, 8 p.
(L15; ST, *Cr*, 8-74)

642-L. **Abrasive Solves Finishing Problem.** *Steel*, v. 142, June 30, 1958, p. 98-99.
Copper powder and abrasive pressed into pellets and sintered have superior properties.
(L10d; Cu, 6-67, Al, 5-60)

643-L. **Application of Centrifugal Shot Descaling Plants in Bar Drawing Plants.** Fritz Kottmeier. *Stahl und Eisen*, v. 78, Mar. 20, 1958, p. 358-364. (Iron and Steel Institute Translation no. 980.)
Previously abstracted from original. See item 405-L, 1958.
(L10c, F27; ST, 4-55)

644-L. (French.) **Surface Treatments. Pt. 2.** *Industrie Chimique*, v. 45, Apr. 1958, p. 98-101.
Theory of degreasing with alkaline washes; alkaline substances and their cleaning power; types of synthetic detergents and their uses.
(L12)

645-L. (French.) **Plastic Coatings on Metal.** Gerard Besson. *Industrie des Plastiques Modernes*, v. 10, May 1958, p. 8-17.
(L26p)

646-L. (French.) **Properties and Fatigue Strength of a Metallized Copper Surface.** J. Salokangas and P. Lehto. *Soudage et Techniques Connexes*, v. 12, May-June 1958, p. 173-181.
Behavior of a Cu layer sprayed on rolls of papermaking equipment. Fatigue tests show that the coating can sustain a load of 10^7 cycles. The quality of the deposit largely depends on operating conditions, and more particularly on wire feed and spraying distance.
(L23, Q7a; Cu, 8-67)

647-L. (German.) **Electrolytic Polishing of Steels.** Viera Rehakova. *Bergakademie*, v. 10, Apr. 1958, p. 241-244.
(L13p; ST)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

648-L. (German.) **Chemical Methods in Protection and Finishing of Metal Surfaces.** R. Brodt. *Industrie-Anzeiger,* no. 94, Nov. 22, 1957, p. 17-19.

Phosphate, chromate and oxide coatings. (L14)

649-L. (German.) **Present Status of Flame Spray Technique.** A. Matting. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 707-708.

(L23)

650-L. (German.) **Structure and Valuation of Flame Spray Layers.** Hans-Dieter Seghezzi and Erich Gebhardt. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 708-713.

4 ref. (L23, M27)

651-L. (German.) **Steel Wires for Metal Spray Pistols.** H. Krautmacher and W. Püngel. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 716-719.

Properties of steel spray wires; determination of hardness of sprayed layers. (L23; ST)

652-L. (German.) **Corrosion Resistant Surface Finish.** K. A. van Oeteren-Panhäuser. *Seifen-Ole-Fette-Wachse,* v. 84, June 11, 1958, p. 371-376.

(L-general, R-general)

653-L. (German.) **Colored Aluminum.** *Technica,* no. 23, Nov. 8, 1957, p. 1309-1311.

5 ref. (L19; Al)

654-L.* **The Mechanism of the Electrochemical Polishing of Metals.** S. Ya. Grilikhes and N. P. Fedotyev. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 563-567.

Results indicate that it is essential to distinguish electrochemical grinding, accompanied by smoothing of the metal surface and electrochemical polishing, accompanied by an increase of the reflecting power of the metal. Smoothing of the microroughnesses of the metal surface in electrochemical grinding is the result of formation of a viscous salt layer near the anode or a salt film on the surface. (L13p)

655-L. **Investigation, by the Charging Curve Method, of the Nature of Local Passivity During Electrolytic Polishing of Copper.** G. S. Vozdvizhenskv and A. I. Turashev. *Academy of Sciences of the USSR, Physical Chemistry Section Proceedings,* v. 114, p. 289-291.

17 ref. (L13p; Cu)

656-L. **Carbides Co-Deposited by Plating Boost Wear Resistance 5 to 1 or More.** *American Machinist,* v. 102, July 28, 1958, p. 80.

Ultra-hard carbides, too brittle to be fabricated, are plated onto nearly any base metal, forming an extremly hard, long-wearing surface. (L17; NM-a35)

657-L. **The Surface State and Anode Potentials of Copper and Nickel in Electrochemical Polishing.** N. P. Fedotyev and S. Ya. Grilikhes. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 677-680.

(L13p; Cu, Ni)

658-L. **A Study of Surface Carbides, Differential Steel Attack and Pore Formation in the Galvanizing Process.** J. J. Sebisty. *Department of Mines and Technical Services, Ottawa, Mines Branch Research Report, R8,* Mar. 14, 1958, p. 1-18.

Massive carbide inclusions on the surface of sheet steel may affect galvanized coatings, as may the type and degree of surface working. (L16, N8r; ST, 9-69)

Metallography

Constitution and Primary Structures

374-M.* **Etching of Germanium Crystals by Ion Bombardment.** G. K. Wehner. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 217-221.

Study of etch effects produced by sputtering Ge crystals and bicrystals under normal incident low-energy (100 ev) Hg + ion bombardment in a low pressure plasma (1 micron gas pressure). Surfaces show preferentially etched pits which readily reveal the crystal orientation. 17 ref. (M20q; Ge)

375-M.* **Phase Analysis of Alnico V Based on Temperature Effects.** R. K. Tenzer and K. J. Kronenberg. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 302-303.

A magnetic analysis of composition of the two Alnico V phases. Structure-independence properties like saturation magnetization and temperature coefficient serve to indicate the correctness of alloys supposed to represent these phases. Model of two-phase structure is derived from electron micrographs. The combined saturation magnetization and the combined temperature coefficients are calculated using the measured properties of the single alloys. The two alloys whose combined properties come closest to those of Alnico V consist mainly of NiAl and Fe_2Co, respectively. 6 ref. (M23a; Al, Ni, SGA-n)

376-M.* **Neutron-Diffraction Observations on the Palladium-Hydrogen and Palladium-Deuterium Systems.** J. E. Worsham, M. K. Wilkinson and C. G. Shull. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 303-310.

Neutron-diffraction investigations on powdered samples show that both hydrogen and deuterium atoms in beta-phase Pd-H and Pd-D are located in the octahedral positions of the Pd lattice. Results obtained for samples with low gas concentration are inconclusive in determining the atomic positions in the alpha phase, since at room temperature only a small amount of gas enters this phase. Although the vibrational amplitudes of hydrogen and deuterium are similar to those observed in other compounds, the total neutron-scattering cross-section for hydrogen in this system is abnormally low, indicating that the protons are more nearly free than in the other hydrogen compounds. 6 ref. (M24b, M22j; Pd, *H*)

377-M.* **Examination of Sintered Aluminum Product Tubes.** W. Evans. *Atomic Energy of Canada Ltd.,* CR MET-753, Mar. 1958, 15 p.

Metallographic examination of three samples of SAP tubing, two of Swiss origin and one of Alcoa M257 material. On annealing, the Swiss samples developed blisters. This is attributed to a high hydrogen content and its diffusion to an oxide-rich zone located near the outer surface of the tubes. The Alcoa M257 sample did not blister on annealing, and its microstructure was found to be satisfactory. (M27, 2-64, 9-71; Al, 6-70)

378-M.* (Japanese.) **Change of Structure of Aluminum.** Ikeno Takashi and Shibata Kizo. *Light Metals,* no. 30, May 1958, p. 11-14.

Change of structure due to heating at 450 and 600° C. of supercooled ingots of high-purity 99.99% Al and 1S and 2S Al alloys. Effect of heating on 1S and 2S ingots cast with tilting mold; relationship between the structure and surface pattern after rolling and anodic oxidation. (M27, 2-61, 3-68; Al)

379-M.* **The Constitution of Alloys of Iron With Ruthenium, Rhodium, Palladium, and Silver.** W. S. Gibson and W. Hume-Rothery. *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 243-250.

Iron-rich binary alloys with Ru, Rh, Pd and Ag investigated by thermal analysis in the temperature range 1380-1560° C. (M24b; Fe, Ru, Rh, Pd, Ag)

380-M.* (French.) **Interpretation of Microphotographs of Fractures.** J. Plateau, G. Henry and C. Crussard. *Métaux Corrosion-Industries,* no. 392, Apr. 1958, p. 141-162.

Features observed on the photographs, obtained with the electron microscope, of surfaces showing cleavage, tensile, or intergranular rupture, for various steels and nonferrous alloys. While photographs permit a better understanding of the mechanism of the rupture propagation, there remain features not readily interpretable because of the insufficiency of the relief, which is often very marked. Authors propose to remedy this by using a stereographic apparatus. 12 ref. (M21e, Q26)

381-M.* (French.) **A Micrographic Examination of Irradiated Uranium.** J. Bloch and J. Bourgues. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 339-344.

Initial results of study of uranium in first three sets of test bars removed from Saclay EL 2 pile. Under influence of irradiation U becomes markedly twinned and its hardness increases. In bars having given energies in excess of 200 MXj/t, U underwent profound changes in microstructure. Numerous fine twins are either curved or displaced through a shear phenomenon; zones of recrystallization with fine, untwinned regular crystals are formed, these zones showing numerous fissures. 6 ref. (M26s, 2-67; U)

382-M.* (German.) **Influence of the Degree of Purity, Casting Conditions and Deformation Temperatures Upon the Forming and Drawing Textures of Aluminum.** J. Grewen and G. Wasserman. *Metall,* v. 12, June 1958, p. 523-525.

The drawing textures of Al wires from continuous and mold castings are observed in relation to the degree of purity and fabrication temperature. On wires from continuous castings the double fiber texture <111> + <001> was always observed, the <111> portion increasing with lower purity and temperature. On wires from mold castings the tendency for the <111> position is favored and was often found exclusively. Tables for Al composition and percentages of fiber textures. 18 ref. (M26c, 2-60, 2-61; Al, 4-61)

383-M.* **Intermetallic Compounds Between Lithium and Lead. Pt. 4. The Crystal Structure of $Li_{20}Pb_5$.** A.

The 13th Metallographic Exhibit

Cleveland, Ohio, October 27 to 31, 1958

All metallographers—
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Entries should carry a label on the *face of the mount* giving:

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Material, etchant, magnification.

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The name, company affiliation and postal address of the exhibitor should be placed on the *back of the mount* together with a request for return of the exhibit if so desired.

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Class 1. Cast irons and steels.

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Class 3. Stainless steels and heat resisting alloys.

Class 4. Aluminum, magnesium, beryllium, titanium and their alloys.

Class 5. Copper, nickel, zinc, lead and their alloys.

Class 6. Uranium, plutonium, thorium, zirconium and reactor fuel and control elements.

Class 7. Metals and alloys not otherwise classified.

Class 8. Series showing transitions or changes during processing.

Class 9. Welds and other joining methods.

Class 10. Surface coatings and surface phenomena.

Class 11. Slags, inclusions, refractories, cermets and aggregates.

Class 12. Electron micrographs.

Class 13. Results by unconventional techniques.

Class 14. Color prints in any of the above classes. (No transparencies accepted.)

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which in the opinion of the judges closely approach the winner in excellence. A Grand Prize, in the form of an engrossed certificate and a money award of $500 from the Adolph I. Buehler Endowment will also be awarded the exhibitor whose work is judged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's national headquarters in Cleveland.

All prize-winning photographs will be retained by the Society for one year and placed in a traveling exhibit to the various Chapters.

40th NATIONAL METAL CONGRESS & EXPOSITION

CLEVELAND PUBLIC AUDITORIUM — — — OCTOBER 27 THRU 31, 1958

Zalkin and W. J. Ramsey. *Journal of Physical Chemistry,* v. 62, June 1958, p. 689-693.

The crystal structure of $Li_{22}Pb_5$ has been determined. The face-centered cubic cell contains 80 Pb atoms in space group F23; the cell constant is 20.08 Å. The packing of the Li and Pb atoms is analogous to that found for LiPb, Li_3Pb_5, Li_3Pb and Li_7Pb_2; these structures resemble the body-centered cubic array present in Li metal, with the appropriate number of Li atoms replaced by Pb. 16 ref.
(M26q; Pb-b, Li)

384-M.* Barium-Lithium Equilibrium System. Douglas V. Keller, Frank A. Kanda and Alden J. King. *Journal of Physical Chemistry,* v. 62, June 1958, p. 732-733.

The X-ray diffraction pattern of $BaLi_4$ is in good agreement with a hexagonal cell having as its dimensions $a_0 = 10.92 \pm 0.01$ A. and $c_0 = 8.94 \pm 0.01$ A. with $c/a = 0.818$. The density was found to be 1.75 ± 0.05 g./cm^3 which requires a cell content of six molecules of $BaLi_4$. (M24b; Ba, Li)

385-M. Investigations on the Build-Up of the Sytsem Iron-Chromium-Carbon. Karl Bungardt, E. Kunze and Elizabeth Horn. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958 p. 193-203. (Iron and Steel Institute Translation no. 1019.)

Previously abstracted from original. See item 222-M 1958.
(M24c; Fe, Cr, C)

386-M.* (French.) Notes on Properties of Copper Oxides Studied by Electron Diffraction. J. Bougnot, J. Marucchi and N. Nifontoff. *Comptes Rendus,* v. 246, Apr. 28, 1958, p. 2484-2487.

Temperatures and modes of formation of CuO and Cu_2O and of subsequent decomposition in vacuum, as temperature increased, of resulting oxide films. 5 ref.
(M26r, M22h, R1h; Cu)

387-M.* (French.) Mechanism of Formation of Banded Structures. Paul G. Bastien. *Technique Moderne,* v. 50, Apr. 1958, p. 121-130.

Banded structure in steels is manifestation of chemical heterogeneity resulting from dendritic segregation during solidification of ingot. Any element introduced into solid solution which provokes displacement of A_3 point of steel is capable of promoting a banded structure. Phosphorus and other impurities, particularly As and Sn, play important role in formation of such structures in carbon and low-alloy steels. 42 ref.
(M28h, N12b; ST)

388-M. Structures of Iron and Chromium Deposited on Copper Single Crystals. A. Goswami. *Faraday Society, Transactions,* v. 54, June 1958, p. 821-825.

An electron diffraction study on the growth of Fe and Cr electrodeposited on Cu (110), (100) and (111) faces. 24 ref.
(M26n, M22h; Fe, Cr, Cu)

389-M. Small Angle Scattering From Cold Worked and Fatigued Metals. H. H. Atkinson. *Philosophical Magazine,* v. 3, May 1958, p. 476-488.

Small angle scattering of X-rays from polycrystalline Cu and single grains of Al deformed by cold work and fatigued by pulsating tension. 15 ref. (M26, M22g, Q24, Q7; Cu, Al)

390-M. Structure of Thallium and Gadolinium at Low Temperatures. C. S. Barrett. *Physical Review,* v. 110, June 1, 1958, p. 1071-1072.

X-ray diffraction at temperatures from 300 to 5° K. is employed to search for a low-temperature transformation in Th. The close-packed hexagonal structure of Gd was found to be stable to 5° K.
(M26, 2-63; Gd, Th)

391-M. (Chinese.) Investigation of Ag-Au-Zn Alloys With 50 At.% Zn. Liu Yi-Huan and Hsu Chen-Chia. *Acta Physica Sinica,* v. 13, Nov. 1957, p. 453-482.

A beta" superlattice structure, with the ideal stoichiometrical formula, $AgAuZn_2$, and isomorphous with that of Heusler alloys, has been found existing over a quite wide range of composition. Its formation is accompanied by a sudden lattice contraction. The effect of gradual substitution of Ag by Au on the atomic distribution is studied systematically. (M24c; Ag, An, Zn)

392-M. (French.) Trace Elements and Metallography. Albert Portevin. *Fonderie Belge,* v. 28, May 1958, p. 147-153.

(M-general, 9-51)

393-M.* (German.) Microcinematography of Transformation Processes in Metals. F. Gabler and R. Mitsche. *Metall,* v. 12, May 1958, p. 362-365.

Microcinematography of metallurgical transformation permits observation of structural processes while happening. A comparatively simple apparatus was developed avoiding a vacuum chamber. Films of steel with 2% C and 4-6% Cr show the growth of martensite crystals. The velocity of growth was found to be between 10 and 100 microns per sec. 57 ref.
(M21g, X5j, N8)

394-M. (German.) Investigations on the Systems V-B, Nb-B, V-B Si, and Ta-B Si. H. Kudielka, H. Nowotny and G. Findeisen. *Monatschefte für Chemie,* v. 88, Jan. 28, 1958, p. 1048-1055.

14 ref.
(M24b, M24c; V, Cb, Si, Ta, B)

395-M.* (German.) Pearlite and Bainite Structures Found in Three Carbon Steels Containing 0.18, 0.50, and 0.86% C. Sten Modin. *Neue Hütte,* v. 3, Apr. 1958, p. 235-238.

Specimens 0.8 mm. thick were held for 10 min. at 1100° C. Isothermal transformation was performed in a metal bath after which the specimens were quenched in 5% NaOH. Specimens were then ground, polished and etched, and lacquer prints were taken with a solution of "Formvar" and "Mowital". The resulting structures showing both pearlite and bainite were examined under an electron microscope.
(M21e, N8h, N8m; CN)

396-M. (German.) Reaction Equilibria Between Liquid Lead and Metal Oxides. Pt. 2. Erich Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, June 1958, p. 247-252.

The reaction equilibria of the systems lead-bismuth-oxygen, lead-copper-oxygen, lead-tellurium-oxygen. 12 tables. (M24c; Pb, Bi, Cu, Te, O)

397-M. (Italian.) Influence of Casting Conditions and of Fe/Si Ratio on the Structure of the Aluminum Alloy AP 5 and Its Mechanical and Deep-Drawing Characteristics. D. Gaulandi and L. Mori. *Alluminio,* v. 27, May 1958, p. 213-223.

Influence of type of casting, the Fe/Si ratio, and heat treatment conditions on the micro and macrostructure, mechanical and deep drawing characteristics of semifinished products. 10 ref. (M27, M28, Q-general, E-general, 2-64, Al, *Fe, Si*)

398-M. Indium-Selenium System. J. C. Brice, P. C. Newman and H. C. Wright. *British Journal of Applied Physics,* v. 9, Mar. 1958, p. 110-111.

Polycrystalline specimens of In_2Se_3, InSe and In_5Se_6 were prepared by direct fusion. Electrical and physical measurements indicated a phase change in In_2Se_3 at 196° C. 10 ref. (M24b; In, Se)

399-M. Metallochemistry and Some of Its Problems. I. I. Kornilov. *Bulletin of the Academy of Sciences of the USSR,* v. 4, 1957, p. 409-417.

Interactions between atoms which result in solid solutions and metallic compounds. 50 ref.
(M25, M26p, M26q)

400-M. Plasticity of Solids Explored by New Technique. John J. Gilman. *General Electric Review,* July 1958, p. 9-12.

Basic explanation of elastic and plastic crystal deformation and examination by means of etch pits.
(M26b)

401-M. Annealing Twins in Zone-Refined Lead and Lead-Silver Alloys. G. F. Bolling and W. C. Winegard. *Institute of Metals, Journal,* v. 86, July 1958, p. 492-496.

Determination of relative interfacial free energy of coherent twin boundaries in zone-refined Pb and Pb-Ag alloys; frequency of twinning. 18 ref. (M27e, P13h; Pb, *Ag*)

402-M. Single Crystal Lattice Rotation During Compression. R. L. Fleischer. *Journal of the Mechanics and Physics of Solids,* v. 6, July 1958, p. 301-306.

It is shown that lattice rotation during compression of a single crystal can be the reverse of that observed in tension rather than slip-plane rotation. 8 ref. (M26; 14-61)

403-M. Electronic Structure of Bismuth Type Crystal. Shoichi Mase. *Physical Society of Japan, Journal,* v. 13, May 1958, p. 434-445.

15 ref. (M25; Bi)

404-M. (English.) Polishing With Diamond—a Quick and Inexpensive Metallographic Polishing Method. Erik Rasmussen. *Ingenioren* v. 1, Oct. 1957, p. 68-72.

(M20p; NM-k37)

405-M. (English.) An Investigation of Ag-Au-Zn Alloys With 50 At. % Zn. Liu Yi-Huan and Hsu Chen-chia. *Scientia Sinica,* v. 6, Dec. 1957, p. 1013-1030.

11 ref. (M24c; Ag, Au, Zn)

406-M. (French.) Influence of the Crystal Orientation of the Surface of Ferro-Chromium Alloys on the Formation of the Equilibrium Profile at High Temperatures. Jean Moreau. *Comptes Rendus,* v. 246, Apr. 28, 1958, p. 2476-2479.

(M26c, 2-62; Fe, Cr, AD-n)

407-M. (German.) Structure of Metal-Rich Phase of V, Cb, and Ta Borides. H. Nowotny and A. Wittmann. *Monatshefte für Chemie,* v. 89, May 31, 1958, p. 220-224.

4 ref. (M26r; B, Cb, Ta, V)

408-M. (Russian.) Theory of Dispersion of X-Rays With Ternary Alloys. M. A. Krivoglaz. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 203-211.

Investigation of dispersal of X-rays on fluctuating concentration of components of ternary ordered alloys. Formula for determination of relationship between intensity of dispersal of monochromatic radiation of monocrystals, and the angle of radiation, orientation of monocrystals, composition of the alloys,

annealing temperature and constant of interatomic interaction. 6 ref. (M21f, M27)

409-M.* (Russian.) **Domain Structure of Highly Coercive Alloys of Manganese-Bismuth.** Ya. S. Shur, E. V. Shtol'ts and L. V. Bulatova. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 234-240.

By means of X-ray powder method study was made of domain structure of MnBi alloy and its changes under influence of magnetic field. The process of magnetic reversal may be dependent on the original state of magnetization. It was possible, for the first time, to visually study the magnetic reversal of various crystals by the process of rotation. Investigation proved that MnBi alloys, consisting of 15 to 20-micron crystals, are separated from one another by nonferromagnetic interlayers. 8 ref.
(M27g, P16c; Bi, Mn)

410-M. (Russian.) **Condition of Surface Layer of Zinc Monocrystals After Grinding and Tempering.** I. A. Gindin and V. S. Kogan. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 326-330.

7 ref. (M26, 3-68; Zn)

411-M. (Russian.) **Metallographic Study of Effect of Deformation at Different Temperatures on Aluminum Monocrystals.** L. I. Vasel'ev. *Scientia Sinica*, v. 7, Jan. 1958, p. 45-57.

17 ref. (M24, 2-61, 3-68; Al-a)

412-M. (Russian.) **Radiographic Study of Mosaic Metal Structure.** Ya. S. Umanskii and L. Kh. Pivovarov. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 549-554.

Review. 48 ref. (M21f, M26)

413-M. (Russian.) **Noncalibrated X-Ray Determination of Cubic Lattice Phases of Large Grain Objects.** Yu. A. Bagaryatskii and Yu. D. Tyapkin. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 554-561.

8 ref. (M21f, M26)

414-M. (Russian.) **Analysis of Atomic Structure in Metals and Alloys.** B. G. Lyashchenko. *Zavodskaya Laboratoriya, v.* 24, May 1958, p. 585-597.

41 ref. (M25)

415-M. (Russian.) **Present Status and Perspectives in Use of Electronographic Method for Investigation of Metals.** Z. G. Pinsker. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 597-604.

Review. 45 ref. (M23s)

416-M. (Russian.) **Conference on Use of Radioactive Isotopes in Ferrous Metallurgy.** V. I. Malkin. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 783-784.

(M23q, S19; Fe)

417-M.* **Etch Pits in Aluminum.** Zenji Nishiyama and Hiroshi Fujita. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 113-128.

Etch pits in Al observed mainly by electron microscope. The pit originates at an etching germ and grows by etching with three composite (100) planes intersecting at the germ. At the beginning of formation it has the form of a circular cavity, but when it becomes larger than several hundred Å in size is angular so that the geometrical type of the pit can be distinguished. In most cases the origin of the germ seems to be the edge dislocation accompanied with the atmosphere of solute atoms, and the etching progress leaves fine contour lines around the germ. 9 ref. (M20q, M21e; Al)

418-M.* **The Crystal Structures of Plutonium—the Delta and Epsilon Phases.** J. G. Ball, P. Greenfield, P. G. Mardon and J. A. L. Robertson. *United Kingdom Atomic Energy Authority, AERE M/R 2416*, 1958, p. 1-10.

Experimental procedure for obtaining X-ray diffraction photographs from Pu metal between room temperature and 530° C. Data for diffraction lines of two of the high-temperature phases, interpretations of the structures. (M22g; Pu)

419-M. The Structure of Steel. Pt. 7. Microscopic Structure. Edwin Gregory and Eric N. Simons. *Edgar Allen News*, v. 37, July 1958, p. 150-151.

(M27; ST)

420-M. On the Martensite Crystal: Electron-Microscopic Study of Etch Pits. Zenji Nishiyama and Ken'ichi Shimizu. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 105-111.

(M26c, M21e; ST)

421-M. (German.) **Metallographic Etching Tests With Germanium Single Crystals.** Zdenek Dragoun, Oldrich Zahejsky and Emil Sipek. *Bergakademie*, Mar. 1958, p. 205-209.

(M20q; Ge, 14-61)

422-M. (Book.) **The Solid State for Engineers.** Maurice J. Sinnott. 522 p. 1958. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $12.50.

(M-general, P-general, Q-general)

N Transformations and Resulting Structures

332-N.* **Production of Graphite Single Crystals by the Thermal Decompoistion of Aluminum Carbide.** L. M. Foster, G. Long and H. C. Stumpf. *American Mineralogist*, v. 43, Mar-Apr. 1958, p. 285-296.

Aluminum carbide, Al_4C_3, dissociates in the vicinity of 2200-2500° C., at atmospheric pressure, to Al vapor and graphitic carbon. Under suitable geometry and heating conditions large, pure, single crystals of graphite can be produced. The crystals have an unusual morphology. In no case is the macroscopic hexagonal symmetry evident. All crystals show growth lines and steps that presumably carry over from the carbide precursor. Twinning and cleavage are common but less frequent than in graphite from other sources. 9 ref. (N3r; NM-k36, 14-61)

333-N.* **Time Decrease of Permeability in Iron.** G. W. Rathenau. *Journal of Applied Physics*, v. 29, Mar. 1958, p. 239-242.

Measurements on iron containing interstitial nitrogen. Relaxation phenomena with different relaxation times can be resolved. Unequal initial stiffness of the domain walls gives rise to satellites of the main relaxation. Activation energy of the main relaxation and its satellites coincides with that known for bulk diffusion. Short demagnetization of the relaxed material prior to time decrease results in wall movement during the measurement and in apparent longer relaxation times. Method has been applied for the determination of the activation volume for interstitial diffusion. Preliminary results of measurements on single crystals given. 10 ref.
(N1; Fe, *N*)

334-N.* (German.) **Critical Consideration of the Formation of Spheroidal Graphite in Cast Iron.** Erich Scheil and Adalbert Wittmoser. *Zeitschrift für Metallkunde*, v. 49, May 1958, p. 256-267.

Three possible types of formation are considered: indirect formation from ledeburite decomposition, direct origin from melt and indirect development from gamma solid solution. (N8s; CI-r)

335-N.* (Japanese.) **Solidification of Pure Aluminum. Pt. 7. The Solidification Constant.** *Light Metals*, no. 30, May 1958, p. 5-10.

When molten Al is cooled by water or mold, and the directional solidification is fixed, the relation between the solidification time (t) and the depth of solidified part (x) is shown by a formula $x = q\sqrt{t}$. The solidification constant (q) contains several variables: temperature of molten Al, cooling water, mold and thermal properties of solid and liquid Al. Temperature of the molten Al has the most significant influence on the solidification constant. 27 ref. (N12; Al-a)

336-N.* (Japanese.) **Aluminum-Magnesium Casting Alloys. Pt. 5. Investigation of Precipitation of Beta Phase.** Nakamura Yasuji. *Light Metals*, no. 30, May 1958, p. 15-20.

Range of Si content that precipitates the secondary beta phase is 0.06% Si for Al with 10% Mg and 0.03% Si and 0.25% Si for 7% Mg and 13% Mg alloy respectively.
(N7, 2-60; Al-b, *Mg, Si*)

337-N.* (Japanese.) **Aging of Al-Cu Alloy by Means of Specific Volume Analysis.** Morinaga Takuichi, Zaima Shigeo and Koshiishi Kazuo. *Light Metals*, no. 30, May 1958, p. 21-25.

Aging of three Al-Cu alloys: 3.116% Cu, 4.240% Cu and 6.200% Cu, respectively. After being kept at 500-520° C. for 30 min., specimens are quenched in water and receive tempered aging at the prescribed temperature. Change of specific volume is then measured. 5 ref. (N7, P10d; Al-b, *Cu*)

338-N.* (Japanese.) **Kinetics of Reaction of Commercially Pure Titanium and Titanium Alloys With O_2, H_2 and N_2.** Kusamichi Hidetake, Yagi Yosiro, Yukawa Toru and Noda Tadao. *Light Metals*, no. 30, May 1958, p. 38-41.

Sponge Ti prepared by the Kroll process and alloying element were arc melted by the consumable electrode double-melting method, and the ingot was forged at 900°, annealed in argon atmosphere at 700° C. and degassed in vacuo. Evolved hydrogen was collected by means of a Bentells pump and measured. (N16m, E25s; Ti, *O, H, N*)

339-N.* (Russian.) **Dispersal of Alloying Elements in Austenic Chromium-Tungsten Steels and Alloys With Varying Nickel Content.** N. F. Lashko and E. Ya. Rodina. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 261-267.

Phase analysis of austenitic steel with 20-60% Ni and variable W, V and Cb as compared with endurance limit tests. Increase in Ni content reduces solubility of carbon and results in corresponding change in composition of hard alloys, and their heat resistant properties. Addition

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

of 1 to 4% V to alloys containing 20% Cr, 60% Ni and 9% W, gives rise to Me_2C type primary carbide on the basis of metastable carbide Cr_2C containing V and W. (N8r, 2-60; SS, SGA-h)

340-N.* Solubility and Diffusion of Carbon in a Silicon-Iron Alloy. D. A. Leak and G. M. Leak. *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 256-262.

Volume diffusion occurs by the same interstitial mechanism as is observed in alpha-iron containing carbon. Carbon atoms in solution also are associated with Si atoms in a similar way to earlier observations on nitrogen in Si-Fe. The solubility of carbon in equilibrium with a precipitated carbide is considerably lower than that for carbon in alpha-iron. 23 ref. (N1e; AY-b; C)

341-N.* Anodic Disintegration of Austenite of a Rimming Steel During Electrolytic Polishing in Melted Salts. Zygmunt Wojcik. *Metaux Corrosion-Industries,* no. 392, Apr. 1958, p. 163-170.

Specimens taken from the pure zone of the blooms of a 0.12% C, 0.51% Mn, 0.014% P, 0.026% S rimming steel were austenized for 1 hr. at 1100° C., and immediately subjected to electrolytic polishing at 900-950° C. and the surface features studied with an electron microscope. Anodic disintegration is compared with the inverse of crystal growth from a few secondary centers. 10 ref. (N8, L13p; ST-d)

342-N.* Mass Spectrometer Measurements of the Diffusion Coefficient of Hydrogen in Steel in the Temperature Range of 25°-90° C. Robert C. Frank, Don E. Swets and David L. Fry. *Journal of Applied Physics,* v. 29, June 1958, p. 892-898.

Diffusion coefficients for hydrogen in mild steel measured in the temperature range 25 to 90° C. A mass spectrometer was used to study the movement of hydrogen through thin steel plates. Two methods of measuring diffusion have been used: the rate of approach to equilibrium when hydrogen is supplied to the plate; the rate of outgassing when the source of hydrogen is removed. 14 ref. (N1a, S11c; ST, H, 4-53)

343-N.* Ratio of the Diffusion Coefficients for the Diffusion of Hydrogen and Deuterium in Steel. Robert C. Frank, Robert W. Lee and Robert L. Williams. *Journal of Applied Physics,* v. 29, June 1958, p. 898-900.

Ratio of the diffusion coefficients for hydrogen and deuterium in steel measured in the temperature range of 26 to 86° C. A mixture of the two gases was introduced into the steel by abrasion in a mixture of normal and heavy water. The diffusion coefficients were measured simultaneously for the two using the mass spectrometer to observe the rate of evolution of the gases from the steel. 6 ref. (N1a; ST, H)

344-N. Solid-State Dissolution of Germanium by Indium in Semiconductor Devices. John Roschen and C. G. Thornton. *Journal of Applied Physics,* v. 29, June 1958, p. 923-928.

Development of small pits or cavities has been observed in Ge semiconductor devices with In metal to Ge semiconductor contacts at temperatures below the melting point of In. The mechanism of cavity formation is a solid-state dissolution of Ge by In with a subsequent more rapid diffusion of Ge in the In, limited by the solid solubility of the Ge in the In. 8 ref. (N1; Ge, In)

345-N.* Study of Order in Annealed and Irradiated Alpha Brass by Lattice Parameter Meaurements. R. Feder, A. S. Nowick and D. B. Rosenblatt. *Journal of Applied Physics,* v. 29, June 1958, p. 984-988.

Increase in short-range order in alpha brass (25 and 30% Zn) produced by thermal treatment or neutron irradiation is accompanied by a measurable decrease in lattice parameter (up to 0.02%). The equilibrium values of the lattice parameter decrease markedly with annealing temperature in the lower range of the measurements (i.e., in the vicinity of 125° C.). The activation energies are given. 13 ref. (N10, 2-64, 2-67; Cu-n)

346-N.* (Italian.) **X-Ray Diffraction Determination of Recrystallization Curves of Reflectal 05 Alloy.** M. Paganelli. *Alluminio,* v. 27, June 1958, p. 263-266.

Study of recrystallization range for 1-hr. anneal revealed that for each degree of prior cold working, temperature of end of recrystallization of Reflectal is higher than that of Raffinal. (N5f; Al-b)

347-N.* (French.) **Diffusion and Chemical Control in the Dissolution of Metals in Mercury.** J. A. R. Bennet and J. B. Lewis. *Journal de Chimie Physique,* v. 55, Feb. 1958, p. 83-90.

Rates of dissolution of cylinders of Pb, Sn and Zn studied and results compared with dissolution of benzoic acid in water, as latter is known as a controlled diffusion process. Whereas dissolution of Pb and Sn is also a controlled diffusion process, it has been found that dissolution of Zn is partially due to a chemical process. To obtain reproducible agitation conditions, coaxially arranged cylindrical specimens were mounted in a revolving cylinder containing Hg. Experiments with Zn monocrystals showed that the different crystallographic faces had different speeds of dissolution. Same phonomenon was noted, qualitatively, for Bi and Cd. 6 ref. (N1a, R2g; Hg, Pb, Sn, Zn)

348-N.* The Martensite Transformations of the Beta Phase in Copper-Aluminum-Nickel Alloys. D. Hull and R. D. Garwood. *Institute of Metals, Journal,* v. 86, July 1958, p. 485-492.

Two types of martensite transformation of the metastable beta phase were observed in an alloy containing 79.5% Cu, 12.8% Al and 7.7% Ni. Both types of martensite form isothermally when the alloy is aged at room temperature after a suitable heat treatment. 24 ref. (N6q; Cu, *Al, Ni*)

349-N.* Kinetics of the High-Temperature Heterogeneous Reaction of Chlorine and Nickel Between 1200 and 1700° K. John D. McKinley, Jr., and Kurt E. Shuler. *Journal of Chemical Physics,* v. 28, June 1958, p. 1207-1212.

The kinetics of the reaction of gaseous chlorine with metallic Ni investigated in a constant-pressure flow system in temperature range from 1200 to 1700° K. and at chlorine pressures between 0.08 and 0.4 mm Hg. (N15d, R6q; Ni, *Cl*)

350-N.* On the Growth of Metal Whiskers by Hydrogen Reduction of Halides. W. W. Webb and E. F. Riebling. *Journal of Chemical Physics,* v. 28, June 1958, p. 1242-1245.

Observations of pressures of hydrogen and hydrogen halide gases prevailing during growth of a variety of metal whiskers by hydrogen reduction of volatile metal halides. (N3r; Ag, Cu, Fe, Co, Ni, Mn)

351-N.* (English.) **Contributions to the Study of the Gamma-Alpha Transformation Without Diffusion in Fe-C Alloys.** Butu Rotenstein, Sofia Caloghiru and Teodor Teitel. *Revue de Métallurgie (Bucarest),* v. 3, no. 1, 1958, p. 99-108.

Experimental curves showing variation of the total quantity of the alpha phase as a function of the time for various initial temperatures of the test bar. The determining factor of the transformation without diffusion is the temperature at which this transformation takes place and not the tensions caused by the sudden cooling. 22 ref. (N8; ST)

352-N.* (French.) **Radio-Isotopes in Industry and Metallurgy.** *Métallurgie et la Construction Mécanique,* v. 90, June 1958, p. 449-461.

Use of radio-isotopes to study metallurgical reactions, solidification of metals, the influence of slags and impurities, the movement of the charge and gases and durability of refractories. (N12, S18q, 1-59; RM-h)

353-N.* (German.) **Growth and Characteristics of Metal Whiskers.** F. Blaha. *Radex-Rundschau,* No. 7, Dec. 1957, p. 882-890.

Growth of metal filaments; mechanical peculiarities of whiskers; theories on manner of origin of filaments; interpretation of the mechanical properties according to crystal models. (N3r, N12, 14-61)

354-N.* Gray Tin Single Crystals. A. W. Ewald and O. N. Tufte. *Journal of Applied Physics,* v. 29, July 1958, p. 1007-1009.

Method of growing gray tin single crystals from a liquid amalgam. Apparatus and specification of the conditions of growth. 9 ref. (N3r, N12; Sn-a, 14-61)

355-N. Conditions for Stability of Graphite, Iron and Its Oxides and Carbides. D. I. Cameron. *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 251-255.

In dealing with iron, carbon and oxygen simultaneously, the two carbides and three oxides cause complications. A simplified method of presentation in terms of the CO and CO_2 percentages of the gases in equilibrium has been worked out to show the regions of stability for Fe_3C, Fe_5C, Fe, FeO, Fe_3O_4, and graphite. 7 ref. (N15d; C, Fe, O)

356-N. Effect of Boron on Grain Size of Steel. L. L. Pyatakova and O. D. Zhizhakina. *Metallovedenie i Obrabotka Metallov.* May 1958, p. 27-30. (Henry Brutcher, Altadena, Calif., Translation no. 4220.)

Confirms influence of small additions of boron on the grain growth during heating. The initial temperature of grain growth may be increased by deoxidation and alloying with ferrotitanium. The effect of hot working on the threshold temperature of grain growth was confirmed. The irregularity of grain growth is caused by uneven distribution of boron along grain boundaries. 6 ref. (N3, 2-60; ST, *B, Ti*)

357-N. (English.) **Energy of Activation of Self-Diffusion in Some Metals.**

Ram Gopal. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 293, Dec. 1957, p. 53-55.
(N1d)

358-N. (Chinese.) **Recrystallization Texture of Cold Rolled Copper Strips.** Y. Ming-Kao and C. Pang-Hsin. *Acta Physica Sinica,* v. 14, Mar. 1958, p. 95-135.

The change from rolling texture to recrystallization texture may be described as a rotation of 45°, 22°, 38°, about a common (111) axis. Different rates of heating and different annealing procedures produced no significant effect. Temperature of annealing was the main factor. (N5, M26c, 2-64; Cu, 4-53)

359-N.* (French.) **Orientation Relationships Between an Unstable Gamma Phase and the Alpha Phase Resulting From Plastic Deformation of the Latter. Tempering of This Alpha Phase.** Paul Bastien and Rene Margerand. *Comptes Rendus,* v. 246, June 9, 1958, p. 3238-3240.

Corrosion figures were used to study the <110> gamma→ <111> alpha orientation relationship previously revealed by X-ray diffraction of an unstable 18-8 austenitic steel subjected to cold plastic deformation. Tempering of the alpha phase is accompanied by germination and grain growth and leads to a disoriented austenitic phase.
(N3, N8a, 2-64, 3-68; SS)

360-N. (German.) **Application of Quantitative Autoradiography in Diffusion Examination of Metals and Alloys.** W. Posch. *Atompraxis,* no. 4, 1958, p. 123-127.

14 ref. (N1c, M23q)

361-N. (German.) **Recovery of Pure Aluminum After Cold Forming.** Gottfried Loeschner. *Bergakademie,* Dec. 1957, p. 600-606.

(N4, G1; Al-a)

362-N.* (German.) **Crystal Growth in Sintered Carbides.** Bohuslav Cech. *Neue Hütte,* v. 3, May 1958, p. 300-302.

On some Cr, C_2-Ni alloys the relations between structural characteristics and strength of carbides are investigated. Grain size of the carbide component as previously observed on WC + Co and Ti + Ni carbides is determined. Influence of the binding component, in particular its crystal size, upon the strength properties of Cr_3C_2-Ni alloys. Grain size depends largely on the sintering time. 9 ref.
(N3m; Cr, Ni, 6-69)

363-N.* (German.) **Influence of Annealing Time Upon the Pearlite-Cementite Phase in a Carbon Steel With 0.86% C.** Helfrid Modin. *Neue Hütte,* v. 3, May 1958, p. 305-306.

Specimens 0.8 mm. thick are heated at 1100° C. and then transferred into a metal bath of 650° C. for times of 2 sec. up to 50 hr. After only 10 sec. about 90% of the austenite was transformed into pearlite. Microstructure observed under light and electron microscope. Microhardness as function of annealing time. (N8h, 2-64; ST)

364-N. (German.) **Diffusion of Ag-Al Alloys.** Th. Neumann and S. Dittrich. *Zeitschrift für Elektrochemie,* v. 61, no. 9, 1957, p. 1138-1146.

Measurements of the diffusion coefficient for Al-rich alloy crystals. 15 ref. (N1a; *Ag,* Al)

365-N. Study of Strain-Hardening and Softening of Iron Alloyed With Manganese. M. D. Perkas. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 8-13. Henry Brutcher, Altadena, Calif., Translation no. 4215.)

Mechanical characteristics of ferrite alloyed with manganese are compared after hardening under various conditions and annealing. Cold working hardened the manganese-alloyed iron more than the unalloyed. Apparently the change in the characteristics of thin structures exposed to cold plastic deformation is one of the basic factors in determining the hardness of ferrite. 9 ref.
(N7e, 2-64, 3-68; Fe, Mn)

366-N.* **Structure of Nickel Electrodeposits in Relation to Some Physical Properties.** D. J. Evans. *Faraday Society, Transactions,* v. 54, July 1958, p. 1086-1091.

Preferred orientation, internal stress, grain size, hardness, surface topography and brightness; [100] and [1101] were the predominant fiber axes found in matte, semibright and bright deposits, and for any given electrolyte [110] was found to be associated with the higher values of internal stress and hardness, while [100] was found to be associated with decreased values.
(N12d, Ni, 8-62)

367-N.* **Non Equilibrium Beta Retention in Fuel Elements.** R. B. Kehce. *United Kingdom Atomic Energy Authority, Technical Note,* IGR-TN/C.855, 1958, 8 p.

Irradiation swelling of U in the beta phase may be less than that at high temperature in the alpha phase owing to the greater strength of the beta phase. During irradiation of U at an alpha temperature, small volumes are raised by the fission heating to the beta phase, and if the induction time for reversion to the alpha phase is sufficiently long a high proportion of the fuel may at any moment be in the beta phase. (N6p, 2-67, T11g; U)

368-N.* **The Upper Temperature Limit of Stability of Guinier-Preston Zones in Ternary Aluminum-Zinc-Magnesium Alloys.** I. J. Polmear. *Aeronautical Research Laboratories (Australia),* Metallurgy Note 9, 1958, 8 p.

The metastable boundary for Guinier-Preston (G. P.) zone formation in ternary Al-Zn-Mg alloys appears as a continuous surface on the phase diagram. This suggests that G. P. zone formation is rather similar over a wide range of composition. (N7, J27; Al, *Zn, Mg*)

369-N. Field Emission From Mercury Whiskers. Robert Gomer. *Journal of Chemical Physics,* v. 28, Mar. 1958, p. 457-464.

Growth mechanism and constitution of whiskers. (N3r; Hg)

370-N. Some Observations on the Aging of Low Carbon Sheet Steel. E. R. Morgan. *Society of Automotive Engineers, Preprint* 30A, Mar. 1958, 10 p.

Demonstrates that all effects of aging can be eliminated by chemical and mechanical control.
(N7; CN-g, 4-53)

371-N. Studies of the Structure of Steels With High Contents of Carbide Forming Alloying Elements. Angelica Schrader. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 461-468. (Iron and Steel Institute Translation no. 723.)

Previously abstracted from original. See item 109-N, 1958.
(N8, M22h; AY)

372-N. A Method for the Determination of the Coefficient of Diffusion of Hydrogen in Steels. Paul Bastien and Pierre Amiot. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 24-38. (Iron and Steel Institute Translation no. 981.)

Previously abstracted from original. See item 173-N, 1958.
(N1a; ST, *H*)

373-N. (English.) **Surface Melt Patterns on Silicon.** G. L. Pearson and R. G. Treuting. *Acta Crystallographica,* v. 11, June 10, 1958, p. 397-399.

Patterns were formed on Si by heating to within a few degrees of the melting point (1412° C.), followed by a rapid quench. Localized melting occurs where specks of impurities reside on the surface. Straight-sided geometrical patterns several microns in extent are thus formed and their shapes are uniquely determined by the surface crystal plane. 9 ref. (N12n)

374-N. (German.) **Formation of an Anomalous Structure in the Lattice of a Pearlite in Cast Steels.** Karel Rydwal. *Bergakademie,* v. 10, Apr. 1958, p. 235-239.

Phosphorus is the main factor in the origin of the anomalous structure. It increases the A_{c3} temperature, so that in the realm of higher phosphorus content the transformation starts earlier. (N8h; ST, *P*)

375-N. (German.) **Influence of the Rate of Heating on the Austenite Grain Size and the Notch Impact Strength.** Jaroslav Cizek. *Bergakademie,* v. 10, Apr. 1958, p. 239-241.

(N3, Q6n, 2-61; ST)

376-N. (German.) **Cooling Curve of Nodular Cast Iron.** L. Sofroni. *Revue de Métallurgie (Bucarest),* v. 3, no. 1, 1958, p. 61-79.

The character of the cooling curve of nodular cast iron as a function of the form of the graphite and its chemical composition. Comparison with cooling curves of gray cast iron. 23 ref. (N12; CI-r)

377-N. (German.) **Diffusion and Solubility of Hydrogen in Alpha-Iron and Silver.** Walter Eichenauer, Herbert Künzig and Alfred Pebler. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 220-225.

New measuring method.
(N1a; Fe, Ag, *H*)

378-N. (Japanese.) **Secondary Recrystallization of Aluminum.** Yasuo Ohno. *Meiji University, Faculty of Engineering, Research Reports,* no. 11, 1958, 8 p.

(N5h; Al)

379-N.* (Russian.) **Mechanism of Reaction Diffusion of Systems Cu-Se, Cu-Te, Ag-Se, and Ag-Te.** V. I. Arkharov and V. O. Esin. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 246-250.

It was experimentally established that the concentration gradient of "needle-like" sinters in the systems Cu-Se, Cu-Te, Ag-Se and Ag-Te is very small. The crystalochemical character of the lattice phase forming in the sinter (Cu_2Se, Cu_2Te, Ag_2Se, Ag_2Te) explains the great anisotropy of the speed of diffusion and the needle-like orientation of the crystals. The structural picture of the process of reactive diffusion in the systems under examination is related to the fact that the process is limited by the speed of the reaction at the metal-sinter boundary. 5 ref. (N1e; Cu, Ag, Se, Te)

380-N. (Russian.) **Study of Kinetics of Gradual Transformation of Supercooled Austenite.** B. A. Leontev, L. S. Palatnik and Ya. I. Spektor. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 304-317.

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

Preliminary transformation of austenite steel in interstitial and martensite regions results in sharp acceleration of interstitial transformation at higher temperatures and considerably reduces speed of pearlite transformation. There is a sharp retardation of interstitial transformation at low temperatures under influence of partial decomposition in upper interstitial regions. A considerable role in kinetics of gradual transformation is played by thin austenite structures which arise during martensitic transformation. 24 ref. (N8h, N8p, 2-61; ST)

381-N. (Russian.) **Effect of Superheating on Properties of Structural Steels.** I. E. Kontorovich and B. M. Voshedchenko. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 340-348.

Character of microstructure as result of preliminary superheating followed by recrystallization within wide temperature intervals. Destruction of old austenitic grain boundaries and their reorientation as result of superheating leads to growth of new grains above the recrystallization temperature. 10 ref. (N5p, N3f, N8, 2-62; ST)

382-N. (Russian.) **Double Annealing of Structural Steel.** L. I. Kogan and R. I. Entin. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 349-354.

Investigation of phase changes in crystal lattice of residual austenite. Annealing at 500-550° lowers carbon content. Relationship between intensity of secondary annealing and extent of reduction of carbon concentration in residual austenitic steel. (N8m, 2-64; ST, SGB-s)

383-N. (Russian.) **On the Kinetics of Preprecinitation in an Alloy of the Duralumin Type.** Marius Protopopescu. *Revue de Métallurgie (Bucarest),* v. 3 no. 1, 1958 p. 81-97.

Theoretical and experimental study of the structural changes occurring in an alloy of the duralumin type during hardening. 15 ref. (N7; Al-b)

384-N.* **A Look At "Whiskers".** George A. Hoffman. *Astronautics,* v. 3, Aug. 1958, p. 31-33.

Observation of the properties of whiskers reveal metallic whiskers exhibit a plastic range, while most compounds sustain elastic strains only up to failure. The modulus of elasticity of a whisker may differ radically from the modulus of a large polycrystalline modulus. Creep has not been observed in temperatures below the normal recrystallization temperature, implying considerable strength retention even at temperatures close to the melting point. (N12, M26)

385-N.* **The Influences of Gaseous Elements on the Graphitization and the Microstructure of White Cast Irons.** Masao Ibaraki and Taira Okamoto. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 15, 1958, p. 145-151.

Influence of oxygen and nitrogen which are introduced on red lead (Pb_3O_4) and potassium ferricyanide ($K_3Fe(CN)_6$), respectively, to melt. 6 ref. (N8s; CI-p)

386-N.* **Yield Phenomena in Copper-Arsenic Alloys.** K. Schröder. *Physical Society, Proceedings,* v. 72, July 1, 1958, p. 33-41.

The occurrence of strain aging in single crystals of arsenical copper (0.36% As) has been established by simultaneous determinations of stress-strain curves and changes in electrical resistivity. During yielding the electrical resistance increased more rapidly than normally. The change of resistance during yielding is explained in terms of Cottrell's model of an impurity atmosphere around dislocations. 9 ref. (N7e, P15g Q23b, Q25; Cu, As)

387-N.* **The Study of Diffusion of Carbon in Nickel and Its Alloys Using the Radioactive Isotope C^{14}.** P. L. Gruzin, Yu. A. Polikarpov and G. B. Fedorov. *United Kingdom Atomic Energy Authority, AERE Lib/Trans 783,* 1958, p. 1-10.

Previously abstracted from original. See item 385-N, 1957. (N1a; C, AY)

388-N. **The Isothermal Transformation of Austenite in Carbon Steels.** S. Modin. *Engineers' Digest,* v. 19, May 19-8, p. 188-192. (From *Jernkontorets Annaler,* v. 142, no. 2, 1958, p. 37-80.)

(N8g, N8h, N8m; CN)

Physical Properties

370-P.* **Surface Tension of Titanium, Zirconium, and Hafnium.** A. W. Peterson, H. Kedesdy, P. H. Keck and E. Schwarz. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 213-216.

Surface tensions of Ti, Zr and Hf at their melting points measured in pure argon atmosphere by drop-weight method. A uniform longitudinal field induction coil was used to melt the sample rod tip. The average values obtained were 1390 ± 40, 1400 ± 40 and 1460 ± 40 dynes per cm., respectively. (P13h; Ti, Zr, Hf)

371-P.* **Nature of Electrical Resistivity of the Ferromagnetic Metals at Low Temperatures.** E. Kondorsky, O. S. Galkina and L. A. Tchernikova. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 243-246.

Resistivity of Ni, Fe and Ni-Cu alloys with Cu up to 25% at temperatures from 2 to 78° K. Empirical formulas. (P15g, 2-63; Ni, Fe, *Cu*)

372-P.* **Flux Reversal in Thin Films of 82% Ni, 18% Fe.** C. D. Olson and A. V. Pohm. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 274-282.

Magnetization reversal process of Fe-Ni films (nominally 82% Ni, 18% Fe) deposited in the presence of a magnetic field to a thickness of about 1000 to 4000 Å. Experimental results indicate at least two different magnetization reversal mechanisms. The first, characterized by relatively long remagnetization periods, involves domain-wall movement: the second, characterized by relatively short remagnetization periods, is consistent with the rotation of the magnetization in the plane of the film. 17 ref. (P16; Ni-b, *Fe,* 14-62)

373-P.* **Domain-Wall Structure in Permalloy Films.** E. E. Huber, D. O. Smith and J. B. Goodenough. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 294-295.

Domain-wall structure in Permalloy films in thickness range 25 to 2000 Å studied by the Bitter technique. A new type of 180° wall has been observed; the main wall is cut at regular intervals by short, right-angle "cross ties" which terminate in free, single ends. The cross-tie period and length are dependent on film thickness, each becoming shorter with decreasing thickness. These patterns can be understood in terms of a new model for the structure of domain walls in thin films of low-anisotropy material. (P16c; SGA-n)

374-P.* **Physical and Magnetic Properties of Elongated Single-Domain Iron and Iron-Cobalt Permanent Magnets.** R. C. Lever, E. J. Yamartino and R. B. Falk. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 304-306.

Physical and magnetic properties of permanent magnets compacted from elongated single-domain particles with metal and organic matrices. Their unique properties which make possible novel design and application possibilities include: demagnetization curve flexibility; high-energy and energy-to-weight ratio; uniformity of pole face flux; low-temperature coefficient of remanence, precise dimensional tolerances; excellent machinability; solderability; low critical material content; and short radioactive half-life. (P16; Fe, Co, SSA-n)

375-P.* **Loss of Exchange Coupling in the Surface Layers of Ferromagnetic Particles.** F. E. Luborsky. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 309-310.

Experiments with spherical Fe particles 28 to 265 Å in diameter demonstrate that the proposed nonferromagnetic surface layer on an Fe particle must be less than 1 Å thick (i.e., about one atomic radius). This conclusion is based upon a comparison of the ferromagnetic Fe calculated from the magnetic saturation, and the total amount of Fe as determined by chemical analysis. 7 ref. (P16; Fe)

376-P.* **Heats of Formation of Liquid Alloys at 1100° by a Simple Reaction Calorimeter.** R. A. Oriani and W. K. Murphy. *Journal of Physical Chemistry,* v. 62, Feb. 1958, p. 199-202.

Design and operation of a high-temperature reaction calorimeter capable of ± 10% accuracy. Enthalpies of formation at 1100° of liquid Ag-Au, Ag-Cu and Au-Ni alloys from their liquid components. Similarity between the interactions in the liquid solution and those in the solid solution. (P12r; Ag, Au, Cu, Ni, 14-60)

377-P.* **The Thermal and Electrical Resistivity of Bismuth and Antimony at Low Temperatures.** G. K. White and S. B. Woods. *Philosophical Magazine,* v. 3, Apr. 1958, p. 342-359.

Electrical resistivity of pure polycrystalline specimens of Bi and Sb over the range 2 to 300° K. and thermal conductivity up to 150° K. Some measurements made in a magnetic field allow separation of the thermal conductivity into electronic and lattice components. Below 50° K., it appears that the heat conductivity of Bi is nearly all due to lattice waves; free electrons seems to contribute little to the conduction or to the scattering. In Sb, however, the lattice conductivity is smaller than might be expected at low temperatures suggesting significant scattering by free electrons. (P11h, P15g, 2-63; Bi, Sb)

378-P.* Superconductivity of Thorium Below 1° K. Norman M. Wolcott and Robert A. Hein. *Philosophical Magazine*, v. 3, June 1958, p. 591-596.

Critical magnetic field of thorium determined between 0.1° K. and 1.37° K., the transition temperature, where the initial slope of the critical field curve is 190 gauss per degree. The data indicate a value of 162 gauss for the critical field at absolute zero. The critical field curve departs from a parabola near the transition temperature. 6 ref. (P15g, 1-63; Th)

379-P.* Characteristics of the Additional Conductivity Induced in Single-Crystal Cadmium Selenide by X-Irradiation. Pt. 2. Kinetic Aspects. S. V. Svechnikov. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 2328-2331. (Translation by American Institute of Physics, Inc.)

Rate of photocurrent rise in single-crystal cadmium selenide studied as a function of X-ray intensity, wave length and intensity of illumination and field and temperature of the specimen. The conductivity kinetics are explained by impurities, and by double optical space-charge currents assignable to transitions. (P15g, 2-67; Cd, 14-61)

380-P. Characteristics of the Additional Conductivity Induced in Single-Crystal Cadmium Selenide by X-Irradiation. Pt. 1. Static Characteristics. S. V. Svechnikov. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 2320-2327. (Translation by American Institute of Physics, Inc.)

The voltage-current and dosimetric characteristics of CdSe single crystals on X-irradiation. Both are super-linear. Experimental observations are explained satisfactorily by supposing a space change to exist in the crystal and adopting Lashkarev's double optical transitions. 13 ref. (P15g, 2-67; Cd, 14-61)

381-P. (French.) **Reactivity of Metallurgical Slag Constituents. Its Relation to Thermodynamic Activity and the Constitution of Melted Silicates.** Traian T. Negresco. *Revue de Métallurgie*, v. 3, no. 1, 1958, p. 5-40.

Effect of temperature, atmospheric oxygen and sulphur content on the modifications undergone by the compositions of a large series of ternary synthetic slags of the type SiO_2-CaO-Al_2O_3, SiO_2-CaO-MgO, SiO_2-CaO-FeO, SiO_2-MgO-FeO, etc. 13 ref. (P12; RM-q)

382-P. (Russian.) **Experimental Investigation of the Viscosity of Basic Martensite Slags. Pt. 1. Viscosity and Electrical Conductivity of Basic Slags Under Laboratory Conditions.** Iosif Tripsha. *Revue de Métallurgie*, v. 3, no. 1, 1958, p. 41-60.

Empirical formulas developed for computing the effect of temperature and chemical composition on the viscosity of martensitic basic slags and the relation between the viscosity and the electrical conductivity. 15 ref. (P10f, P15g; RM-q)

383-P.* Study of the Distortion of High-Carbon High-Chromium Die Steels. K. Sachs. *Iron and Steel Institute, Journal*, v. 189, July 1958, p. 216-224.

Test reveals the influence of carbide distribution on the susceptibility to distortion. Accentuated distortion resulting from a longitudinal temperature gradient emphasizes the importance of even temperature distribution in the hardening furnace. 7 ref.
(P10d, W24n, 2-64; TS-b, Cr)

384-P.* (English.) **Magnetic Annealing Effect in 2% Cobalt-Copper Alloy. Pt. 1. Induced Ferromagnetic Anisotropy.** Tadayasu Mitui. *Physical Society of Japan, Journal*, v. 13, June 1958, p. 549-559.

The behavior of ferromagnetic precipitates in Cu-Co alloy containing 2% Co heat treated with magnetic field. The magnitude of magnetic anisotropy induced by magnetic annealing measured as functions of the aging temperature, aging time and intensity of magnetic field. 26 ref. (P16; Cu, Co)

385-P.* (French.) **Possible Effect of Air on Very Thin Films of Silver.** Jean Trompette. *Comptes Rendus*, v. 246, June 9, 1958, p. 3235-3238.

On basis of calculated indices of refraction and extinction of thin film and solid metal, optical constants of thin film of Ag deposited by thermal projection on strip of quartz were determined for film in vacuum and subsequently under atmospheric pressure. 4 ref.
(P17a, 2-66; Ag)

386-P.* (French.) **Thermomagnetic Study of the Allotropic Forms of Plutonium.** M. Seguin, M. M. Folmer, J. Friedel and E. Grison. *Comptes Rendus*, v. 246, June 9, 1958, p. 3243-3246.

Magnetic susceptibility of Pu determined over wide range of temperature by combining measurements taken during heating and cooling. No magnetic anomaly was noted; none of the allotropic forms appear to present paramagnetism of Curie-Weiss type. 7 ref. (P16; Pu)

387-P.* The Fluidity of Some Aluminum Alloys. S. Floreen and D. V. Ragone. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 391-393.

The fluidity of Al-Cu (0.33% Cu) and Al-Mg alloys (0.33% Mg) was measured using glass tubes as the fluidity channel. The fluidity of the alloys both at the liquidus and above varies inversely with the solidification range. 6 ref.
(P10f; Al-b, Cu, Mg)

388-P.* Magnetic Properties of Type 400 Series, 17-4 PH, and AM 355 Stainless Steels. J. V. Alger. *Bettis Technical Review*, WAPD-BT-7, Mar. 1958, p. 131-137.

The magnetic induction behavior of various types of stainless steels is utilized to design magnetic devices associated with reactor control rod drive mechanisms.
(P16; SS-b)

389-P.* Domain Observations on Iron Whiskers. R. W. DeBlois and C. D. Graham. *Journal of Applied Physics*, v. 29, June 1958, p. 931-939.

Ferromagnetic domain walls have been observed by standard methods on iron whiskers. The whiskers are square in cross section, generally 20 to 60 microns on a side, and up to 1 cm. long. The whiskers are single crystals with the axis in a <100> direction and the faces nearly perfect {100} planes. The domain patterns are exceptionally clear and simple. Several characteristic patterns have been described and represented with three-dimensional models. 15 ref. (P16c; Fe, 14-61)

390-P. Relation Between Crystallite Orientation and Magnetic Properties of Elongated Single-Domain Iron Particles. E. F. Fullam and D. S. Hallgren. *Journal of Applied Physics*, v. 29, June 1958, p. 989-993.

Crystallographic orientation of the particles, determined by electron diffraction, is compared to the orientation inferred from the observed morphology and magnetic properties. 15 ref. (P16; M26c, Fe)

391-P.* Polarization and Overpotential of Au-Cu Alloy in Aqueous Solutions. I. A. Ammar and S. Riad. *Journal of Physical Chemistry*, v. 62, June 1958, p. 660-664.

Cathodic and anodic polarization measurements have been carried out on an alloy of Au and Cu in aqueous solutions. Attempts have been made to explain the results obtained and these have been compared with the results on pure Au and Cu.
(P15; Al-b, Cu-b)

392-P.* Volume Change of Indium Antimonide During Fusion. Norman H. Nachtrieb and Noriko Clement. *Journal of Physical Chemistry*, v. 62, June 1958, p. 747-750.

The change in volume of indium antimonide on fusion determined from measurements of the change in pressure of argon at constant volume. The average of six determinations gives $100\ \Delta V/V_s = 13.7 \pm 0.5\%$, referred to the solid. 9 ref. (P10d; In, Sb)

393-P. Study on Castability. Pt. 2. Kazuo Hori. *Kumamoto University, Faculty of Engineering, Memoirs*, v. 5, Dec. 1957, 2 p.

Viscosity and fluidity of molten metal. (P10f, E-general)

394-P. A Review of Heat Transfer Literature, 1957. E. R. G. Eckert, J. P. Hartnett and T. F. Irvine. *Mechanical Engineering*, v. 80, June 1958, p. 64-75.

Reviews conduction, channel flow, boundary layer flow, flow with separated regions, transfer mechanism, natural convection, transpiration cooling, change of phase, radiation, liquid metal, measurement techniques and heat transfer applications. 270 ref. (P11k)

395-P.* Heat Capacity of Copper-Germanium Alloys Below 4.2° K. John A. Rayne. *Physical Review*, v. 110, May 1, 1958, p. 606-611.

Heat capacity measurements below 4.2° K. on a series of alloys in the primary phase of the Cu-Ge system. When corrected for lattice expansion, the resulting change in the electronic specific heat for low electron/atom ratios is found to be the same as that for the Cu-Zn system. 20 ref. (P12r, 2-63; Cu, Ge)

396-P.* Lattice Conductivity of Tin. M. Garfinkel and P. Lindenfeld. *Physical Review*, v. 110, p. 883-887.

Thermal conductivities of several impure Sn specimens measured at liquid helium temperatures. Impurities of antimony, bismuth and indium between 0.1 and 6% were used to lower the electronic conductivity. Investigation was aimed at obtaining a measure of the lattice contribution to the thermal conductivity of Sn. 13 ref.
(P12h, 2-63; Sn, *Bi, In, Sb*)

397-P. The Variation With Temperature of the Magnetic Leakage Field in Cobalt. M. Blackman and E. Grunbaum. *Royal Society Proceedings*, v. 245, June 24, 1958, p. 408-416.

The variation with temperature of the magnetic leakage field of an unmagnetized crystal of hexagonal Co investigated by means of an electron beam. It was found that the strength of the magnetic leakage field decreased steadily with increasing temperature. 12 ref. (P16; Co)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

398-P. Surface States on Germanium. George Wallis. *Sylvania Technologist,* v. 11, Jan. 1958, p. 6-12.

The properties of slow and fast surface states on etched Ge; some methods of investigating the states. 25 ref. (P15; Ge)

399-P. Thermal Conductivity of Tellurium. G. B. Bagduev and M. A. Kazhlaev. *Soviet Physics, "Doklady",* v. 2, 1957, p. 556-558. (Translation by American Institute of Physics, Inc.)

Results of investigations of the temperature dependence of thermal conductivity λ in pure Te from 10° to 500°. The thermal conductivity was determined by the plane compensating method [3] in a vacuum which protected the specimens from oxidation at the melting point. 9 ref. (P11h; Te)

400-P. Vitreous Semiconductors. Some Properties of Materials in the As_2Se_3-As_2Te_3 System II. T. N. Vengel and B. T. Kolomiets. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 2314-2319. (Translation by American Institute of Physics, Inc.)

6 ref. (P15; As, Se, Te)

401-P. Superconductivity of Beryllium Films Condensed on a Cold Backing. B. G. Lazarev, A. I. Sudovtsev and A. P. Smirnov. *Soviet Physics JETP,* v. 6, Apr. 1958, p. 816-817. (Translation by Consultants Bureau, Inc.)

Thickness of the measured films was approximately 10^{-6} cm. The only stable films were those thinner than 10^{-5} cm.; further increase in thickness caused them to crack. (P15g; Be)

402-P.* (French.) **An Approximation of the Free Enthalpy Diagram of the Ternary System Fe-Mn-Si at 1600° K.** Etienne Bonnier. *Comptes Rendus,* May 5, 1958, p. 2617-2619.

Binary and ternary phase diagrams of the system Fe-Mn-Si were used as experimental basis for estimation of curves of activity of the constituents, using known phase relationships, certain "standard" features of solutions and the Gibbs-Duhem equation. 8 ref. (P12r, M24c; Fe, Mn, Si)

403-P.* (French.) **Refractoriness of the Serpentine - Dolomite System.** A. Braniski. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 127-144.

A study of the variation of the refractoriness of 80 different serpentine and dolomite ceramic mixtures in which the percent dolomite increased from 0 to 100. (P11; RM-h)

404-P.* (Spanish.) **Porosity in 85-5-5-5 Type Bronze Castings. Pt. 2. Effect of Thickness of Section, Pouring Temperature and Feeder System.** Sebastian F. Matas. *Revista de Ciencia Aplicada,* v. 12, May-June 1958, p. 238-244.

Parts with sections of graduated thickness revealed decrease in density of bronze as thickness of section increased. However, an irregular low density was noted for 3-mm. section poured at 1120° C. Increase in pouring temperature appeared to increase density of 3-mm. section. Density of 6-mm. sections varied little with different pouring temperatures. Porosity produced at low temperature pouring due to nonfilling of microcavities caused by contraction is of same order as that produced at higher temperatures by release of gases; 12 and 24-mm. sections showed decrease in density with increase in pouring temperature. In casting of hollow cylinders, no appreciable influence of feeder design was revealed by pressure tests under water; metallurgy of bath seems to be more important factor here. 5 ref. (P10a, P10m, E-general; Cu-s)

405-P. Thermodynamic Properties of Solid Solutions. Pt. 1. Copper + Zinc Solid Solution. B. B. Argent and D. W. Wakeman. *Faraday Society, Transactions,* v. 54, June 1958, p. 799-806.

Thermodynamic functions for Zn in Cu-rich solid solutions of the system Cu-Zn calculated from measurements of vapor pressure. 22 ref. (P12, M24b; Cu, Zn, 14-67)

406-P. The Thermodynamic Properties of Solid Solutions. Pt. 2. Copper-Rich Primary Solid Solutions of Copper + Zinc + Gallium and Copper + Zinc + Germanium. B. B. Argent and D. W. Wakeman. *Faraday Society, Transactions,* v. 54, June 1958, p. 807-813.

Thermodynamic functions for Zn in Cu-rich solid solutions of the systems Cu-Zn-Ga and Cu-Zn-Ge calculated from measurements of vapor pressure. Thermodynamic functions are discussed in terms of electronic and lattice distortion effects. 21 ref. (P12, M24b; Cu, Ga, Ge, Zn, 14-67)

407-P. The Heats of Formation in the System Aluminum + Nickel + Titanium. O. Kubaschewski. *Faraday Society, Transactions,* v. 54, June 1958, p. 814-820.

The heats of formation of 49 ternary and 27 binary alloys in the Ni-Ti-Al system determined from the component metals. 11 ref. (P12q, M24b; Al, Ni, Ti)

408-P. Enthalpy of Formation of Lithium and Barium Bismuthides. S. A. Shchukarev, M. P. Morozova, Kan Kho Yn and V. T. Sharov. *Journal of General Chemistry of the USSR,* v. 27, 1957, p. 321-323.

11 ref. (P12r, M24b; Li, Ba, Bi)

409-P. The Enthalpy of Formation of Lithium, Magnesium and Zinc Arsenides. S. M. Ariya, M. P. Morozova, Khuan Tszi-tao and E. Volf. *Journal of General Chemistry of the USSR,* v. 27, 1957, p. 325-327.

7 ref. (P12r, N24b; As, Li, Mg, Zn)

410-P. Thermo-Electricity at Low Temperatures. Pt. 6. A Redetermination of the Absolute Scale of Thermo-Electric Power of Lead. J. W. Christian, J. P. Jan, W. B. Pearson and I. M. Templeton. *Royal Society Proceedings,* v. 245, June 3, 1958, p. 213-221.

(P15p, 2-63; Pb)

411-P. (German.) **Mechanism of Conductivity in the System Cu-Te.** Günther Harbetke. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 9, 1957, p. 180-188.

Measurements of electrical conductivity, Hall effect and infrared absorption of compact samples and evaporated layers of Cu_2Te. 17 ref. (P15g, P15p, P17c; Cu, Te)

412-P. (German.) **Temperature Dependence of the Photo-Electric Effect of Sb-Cs Photo Cathodes in the Temperature Range −170 to +20° C.** Zs. Naray. *Annalen der Physik,* v. 20, Nov. 30, 1957, p. 386-389.

5 ref. (P15p, 2-61; Cs, Sb)

413-P. (German.) **Measurements of Conductivity in Zinc Powder Coatings.** H. Ladeburg and H. Ammer. *Deutsche Farbenzeitschrift,* May 1958, p. 181-186.

(P15g; Zn, 8-70)

414-P.* (German.) **Present State of Development and Production of Transformer Sheet (3% Si).** Günther Rassmann. *Neue Hütte,* v. 3, Apr. 1958, p. 193-203.

Magnetic and electrical properties of hot and cold rolled transformer sheets—watt losses, minimum induction, coercive force and hysteresis losses. Magnetic properties can be greatly improved through higher temperatures during final annealing. Texture of cold rolled steel is important and depends on the carbon and nitrogen contents. 11 ref. (P15, P16; ST, *Si,* SGA-n)

415-P.* (German.) **Viscosity Observations in the System CaO-SiO_2-Al_2O_3 and Their Applicability on Slags Obtained From Direct Reduction.** Johann Schleier. *Neue Hütte,* v. 3, May 1958, p. 282-293.

Slags in the direct reduction process present a problem during beneficiation of lower grade iron ore. Extensive experiments and tests were carried out to determine the influencing factors on slag formation. Viscosimeter was developed by the use of the principle of rotating cylinders permitting absolute viscosity measurements in the range of 10 to 100,000, Poise. Synthetic slags were tested and viscosity diagrams for 1300, 1400 and 1500° C. were developed. 47 ref. (P10f, D11n; RM-b)

416-P. (German.) **Modification of Physical Properties of Ferromagnetic Materials in Magnetic Fields.** H. Jahn. *Technik,* Jan. 1958, p. 29-35.

Influence of fields of force on ferromagnetic materials. (P16e, 2-67)

417-P. (German.) **Method of Determination of Heat Conductivity of Thin Specimens at High Temperature.** Franz Ph. Pott. *Zeitschrift für Naturforschung,* v. 13a, Feb. 1958, p. 116-125.

8 ref. (P11h)

418-P. (German.) **Magnetic Properties and Electron-Microscope Structure of Electrolytically Deposited Thin Layers of Nickel-Iron Alloys.** Ludwig Reimer. *Zeitschrift für Physik,* v. 150, Dec. 21, 1957, p. 99-105.

10 ref. (P16, M21e; Ni, Fe)

419-P. (German.) **Measuring Hall Effect in Ferromagnetic Nickel Layers.** Ludwig Reimer. *Zeitschrift für Physik,* v. 150, Feb. 14, 1958, p. 277-286.

22 ref. (P15p, P16; Ni)

420-P. (German.) **Electron Emission Observation of Metal Surfaces.** W. Bayh. *Zeitschrift für Physik,* v. 151, May 1958, p. 282-295.

17 ref. (P15k)

421-P. (German.) **Magnetic Tests With Chromium and Chromium Solid Solutions.** Rudolf Lingelbach. *Zeitschrift für Physikalische Chemie,* v. 14, Jan. 1958, p. 2-31.

(P16; Cr, 14-67)

422-P. (Italian.) **Introduction to the Theory of Electrical Conduction in Semiconductors.** G. Bonfiglioli. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 126-130, 148.

Electrical conduction theories of Drude and Lorentz and of Sommerfeld, most recent band theory of solids for explaining electrical conduction and the phenomenon of semiconductivity. Shockley's con-

ception of conduction by electrons and holes. Effect of impurities in semiconductors. (P15g, 3-69; EG-j)

423-P. (Italian.) **Electronics of Semiconductors and Their Applications.** M. G. de Plabachelerie. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 131-135.

The structural properties of semiconductors, with Ge taken as a reference, and the conditions under which intrinsic and extrinsic conductivity by electrons and holes is obtained. Nature of n-type and p-type semiconductors. List of rectifiers, transistors, and other devices based on semiconductors now on the market. (P15g, M27, T1k; Ge, EG-j)

424-P. (Japanese.) **Magnetic Properties and Microstructure of the Permanent Magnet Alloy Alcomax.** Kyoji Tachikawa. *Institute of Science and Technology in Tokyo University, Report,* v. 12, no. 1, 1958, p. 1-8.

Influence of heat treatment on magnetic properties and microstructure of the high-coercive-force alloy Alcomax as well as Alnico 5. (P16, M27; SGA-n)

425-P. Nuclear Magnetic Resonance in Indium Antimonide. Pt. 1. The Effect of Impurities. E. H. Rhoderick. *Philosophical Magazine,* v. 3, June 1958, p. 545-563.

32 ref. (P16f, 3-69; In, Sb)

426-P. Nuclear Magnetic Resonance in Impure Indium Antimonide. M. H. Cohen. *Philosophical Magazine,* v. 3, June 1958, p. 564-566.

4 ref. (P16f; In, Sb)

427-P. Thermo-Electric Properties of Lead Telluride. E. Z. Gershtein, T. S. Stavitskaia and L. S. Still'bans. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 2302-2313. (Translation by American Institute of Physics, Inc.)

21 ref. (P15; Pb, Te)

428-P. The Surface Tensions of Ternary Hg-Cd-K Metallic Solutions at 22° C. P. P. Pugachevich and V. B. Lazarev. *Academy of Sciences of the USSR, Proceedings,* v. 113, 1957, p. 157-159. (Translation by Consultants Bureau, Inc.)

13 ref. (P13h; Ag, Cd, K)

429-P. The Influence of Technological Factors on the Electromagnetic Properties of Cold Rolled Transformer Steel. M. M. Ioffee, A. G. Petrenko and G. F. Chub. *Stal',* v. 17, Oct. 1957, p. 936-940. (Iron and Steel Institute Translation no. 897.)

Previously abstracted from original. See item 98-P, 1958. (P16, 2-60, 1-73; ST, SGA-n)

430-P. (English.) **The Thermoelectric, Galvanomagnetic and Thermomagnetic Effects of Monovalent Metals.** Mikio Tsuji. *Physical Society of Japan, Journal,* v. 13, Feb. 1958, p. 133-148.

35 ref. (P15, P16)

431-P. (German.) **Determination of Thermodynamic Activity Using Vapor Pressure Comparative Method Illustrated on Liquid Gallium-Cadmium Alloys.** Bruno Predel. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 226-231.

(P12b, P12c; Cd, Ga, 14-60)

432-P. (Slovenian.) **Application of Thermodynamics in Metallurgy. Pt. 2.** A. Podgornik. *Rudarsko-Metalurški Zbornik* no. 1, 1958, p. 27-41.

Methods of quantitative thermal analysis applied in industry for the investigation of metal systems. (P12)

433-P.* **Concerning the Change of the Electrochemical Activity of Zirconium Under the Action of Radiation.** I. L. Rozenfeld and E. K. Oshe. *Proceedings of the Academy of Sciences of the USSR, Physical Chemistry Section,* v. 114, p. 277-280.

By irradiating the elements Zr-Al and Zr-Fe in a flowing electrolyte (3% NaCl) with a stream of high-energy electrons at an intensity of 15 microampere per cm^2 a sharp increase in the current of the couples was observed. (P15g; Zr, 2-67)

434-P.* **Thermal Expansion of Lead at Low Temperatures.** P. N. Dheer and S. L. Surange. *Philosophical Magazine,* v. 3, July 1958, p. 665-674.

Changes in length of lead rod due to thermal expansion measured between 4.2 and 10° K. by a heterodyne-beat method in which the changes modify the capacity of a condenser in a resonant circuit. 9 ref. (P11g; Pb, 2-63)

435-P.* **Effects of Heat and Pressure on the Swelling of Irradiated Uranium.** A. T. Churchman, R. S. Barnes and A. H. Cottrell. *United Kingdom Atomic Energy Authority, AERE M/R 2510,* 1958, p. 1-14.

Small pieces of a natural uranium fuel bar, after irradiation at below 300° C., were heated to higher temperatures under various pressures. Conclusion is drawn that swelling is caused by the separation of the fission gases, krypton and xenon, to form gas pockets in the metal. Mechanism of swelling. 13 ref. (P11g, U; 2-62, 3-74)

436-P. Magnetic Properties of the Gd-La and Gd-Y Alloys. W. C. Thoburn, S. Legvold and F. H. Spedding. *Physical Review,* v. 110, June 15, 1958, p. 1298-1301.

(P16; Gd, La, Y)

437-P. Heat Conduction in Bismuth Telluride. H. J. Goldsmid. *Physical Society Proceedings,* v. 72, July 1, 1958, p. 17-26.

14 ref. (P15g, Bi, Te)

438-P. (German.) **Mechanism of Wire Explosions.** E. Fünfer, M. Keilhacker and G. Lehnar. *Zeitschrift für Angewandte Physik,* v. 10, Apr. 1958, p. 158-162.

Copper and silver wires vaporized by electric discharge. Observation by oscillograph and by optical methods. Estimation of the temperature developed by wire explosion. 18 ref. (P15p, S16; Ag, Cu, 4-61)

439-P. (Book—German.) **Physical Properties of Metals.** Eckart Vogt. v. 1. 1958, 467 p. Akademische Verlagsgesellschaft, Geest & Portig, Leipzig, Germany. DM 59.

Metals from point-of-view of atomic physics; electron theory applied to metals; thermo-elastic behavior; diamagnetism, paramagnetism and primary ferromagnetic properties; secondary ferromagnetic properties. 742 ref. (P-general)

Q Mechanical Properties and Tests

822-Q. (Dutch.) **Material Problems Related to Brittle Fracture in Supertankers.** Georg Vedeler. *Lastechniek,* v. 24, May 1958, p. 76-84.

13 ref. (Q26s, T22, T26q; ST)

823-Q.* **Relation of Microhardness and Stresses in Copper Alloys.** P. J. LeThomas. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 41-48.

Microhardness of Cu or Cu alloys was measured in the proximity of cracks or break areas. When the test piece has been subjected to mechanical constraints, the microhardness reaches abnormal value in these regions. (Q29q, Q25; Cu)

824-Q.* **Ductile Iron—Alloyed and Normalized.** C. R. Isleib and R. E. Savage. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 75-83.

Mechanical properties were determined for four types of ductile iron: unalloyed, with Ni, Ni-Mo and Ni-Mo-V. Three conditions of heat treatment investigated: as cast; normalized; and normalized and tempered. 5 ref. (Q-general, 2-60, 2-64; CI-r)

825-Q.* **Transfer of Tungsten Carbide to Soft Metals During Single-Traverse and Reciprocating Sliding.** J. Golden and G. W. Rowe. *British Journal of Applied Physics,* v. 9, Mar. 1958, p. 120-121.

A small radioactive tungsten carbide hemisphere was slid slowly over Cu and steel plates. The tungsten carbide transferred to the plates was assessed by counting and autoradiography. On well-prepared Cu about 50×10^{-12} g. was transferred steadily to each mm. of track during a single traversal. This carbide was firmly embedded in the Cu, even after several traversals in each direction. Single traversals on mild and stainless steels also produced steady embedded wear, but with reciprocating traversals a considerable portion of the carbide was scattered loosely on the surface. (Q9; Cu, CN, SS, W, 6-69)

826-Q.* **A "Super-Elastic" Single Crystal Calibration Bar.** W. A. Rachinger. *British Journal of Applied Physics,* v. 9, June 1958, p. 250-252.

Elastic strains of up to 4% can be attained in a Cu-Al-Ni alloy in the form of a single crystal suitably heat treated. The high elasticity is due to a reversible martensite transformation induced by stressing. Methods of production and heat treatment of large crystals; details of mechanical properties. The alloy can be machined by conventional methods. Suggestions for development of other superelastic alloys. 5 ref. (Q21; Cu, Al, Ni, 14-61)

827-Q.* **Some Factors Affecting the Toughness of Mild Steel Castings.** Herbert H. Fairfield and John A. Ortiz. *Modern Castings,* v. 34, July 1958, p. 70-74.

Influence of sulphur, carbon and hydrogen on ductility; effects of various steelmaking operations. All reduction of area values quoted (used as the measure of toughness) are from separately cast test bars which have been normalized from 1650° F. and drawn for 8 hr. at 1250° F. 16 ref. (Q23p, 2-60; CN, 5-60)

828-Q.* **Plastic Deformation of Nickel Single Crystals at Low Temperatures.** Peter Haasen. *Philosophical Magazine,* v. 3, Apr. 1958, p. 384-418.

Single crystals of Ni (purities 99.98 and 99.4%) were deformed in tension at various temperatures between 4.2 and 300° K. Shear stress-shear strain relations, and reversible change of flow stress with temperature. The work-hardening parameters obtained are discussed in terms of dislocation theory developed mainly on the basis of data on Al and Cu. From the temperature dependence of the stress at the

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

beginning of dynamical recovery the activation energy of cross-slip is estimated to be slightly lower than that of Cu, implying a somewhat higher stacking fault energy. 40 ref. (Q24, 263; Ni, 14-61)

829-Q.* The Cleavage of Metal Single Crystals. A. N. Stroh. *Philosophical Magazine,* v. 3, June 1958, p. 597-606.

A model of cleavage applicable to metals cleaving on the slip plane is developed in which a crack is initiated at the end of a low-angle tilt boundary terminating inside the crystal. The strength of the metal is determined by the difficulty of growth of the crack. Satisfactory agreement is obtained with the experimental results for Zn. 10 ref. (Q26n; 14-61)

830-Q. Ultra High Strength, Heat Resisting Steel. John C. Hamaker. *Society of Automotive Engineers, Preprint* S67, Mar. 1958, 12 p.

A 5% Cr air hardening steel appears to be the best presently available for either ultra-high strength applications at room or low temperatures, or for elevated temperature stability to 1000° F. In the 220-300,000-psi. tensile range, this steel provides significantly higher impact strength and ductility than low-alloy steels, and 20 to 35% higher fatigue strength than any air melted material previously reported. From 400 to 1000° F., its strength-to-weight ratio surpasses all materials, including heat treated Ti alloys. (Q-general; AY, SGA-h)

831-Q. Research and Development on Investigation of Galling and Friction Characteristics of Metallic Materials and Surface Treated Materials. E. W. Gaylord. Carnegie Institute of Technology. *U. S. Office of Technical Services,* PB 131347, July 1956, 63 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.75.

Tests of rubbing and friction characteristics disclosed that when Ti surfaces are to rub on Ti surfaces, both should be coated. When Ti surfaces are rubbed on other metals, only the Ti need be coated, if the other surfaces are not easily scratched or galled. (Q9p; Ti)

832-Q. Test Methods for Magnesium Surface Treatments. F. W. Pfohl and H. T. Francis. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131600, Nov. 1957, 62 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.75.

New method based on measurement of paint adherence after exposure to a corrosive environment. The technique involved the "gauze-peel test", in which a gauze strip is embedded in the organic coating. After exposure to accelerated corrosion, the gauze is peeled from the surface. Both quantitative evaluations (peel strength) and qualitative (visual examination of the stripped area) can be easily made.
(Q10c, L-general; Mg)

833-Q. The Determination of the Effect of Heat Treatment on the Elevated Temperature Stress-Stability of Titanium Alloys. G. A. Lenning, M. L. Greenlee, W. M. Parris and H. D. Kessler. Titanium Metals Corp. of America. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131724, Feb. 1958, 87 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.25.

Determination of the effects of heat treatment on the stress stability or notch stability of three Ti alloys representative of the alpha-beta type. Ti-140A (2Fe-2Cr-2Mo), Ti-155A (5Al-1.5 Fe-1.5CR-1.5Mo), and Ti-6Al-4V. Duplex solution and age-type heat treatments were shown to provide improvement in strength and creep resistance of the alloys without loss of either stress stability or notch ductility.
(Q23, Q27a, Q3m, 2-64; Ti-b)

834-Q. Development of Improved Titanium Alloys for Application at Elevated Temperatures. B. S. Lement. Manufacturing Laboratories, Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131749, Mar. 1958, 73 p. (Available from Office of Technical Services, Washington 25, D. C.) $2.

Aluminum improves high-temperature strength of titanium, but higher than 6% the alloys may be brittle at room temperature. Nature of this embrittlement studied in binary alloys containing 6 to 12% Al. Changes in bend ductility, hardness, precision length, electrical resistance, lattice parameters and microstructure which occur on solutionizing and aging.
(Q-general, 2-62; Ti-b)

835-Q.* (French.) **Microhardness Testing Reveals Stress Undergone by Copper and Copper Alloy Parts.** Pierre-Julien Le Thomas. *Fonderie,* no. 148, May 1958, p. 201-210.

Case histories of eight types of test pieces and parts subjected to various types of fatigue testing or broken in actual service. Influence of temperature, load, work conditions, chemical composition and other factors. 3 ref. (Q29q, Q7; Cu)

836-Q.* (German.) **Twin Formation in Zinc Monocrystals.** Rolf Siems and Peter Haasen. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 213-219.

Mechanism of twinning. Loading was increased step-by-step until twins occurred and the twinning was studied by means of microscopy and micro-cinematography. The role of local stress in twin formation was investigated. (Q24b; Zn)

837-Q. (Japanese.) **High-Strength Stainless Steels.** K. Toda. *Metals,* v. 28, June 1958, p. 401-408.

Review of recently developed steels such as 17-7 PH possessing high strength in addition to corrosion resistance. Mechanical properties, composition, structure and method of hardening.
(Q-general, J-general, M27; SS)

838-Q.* Production and Properties of Aluminum Alloyed Cast Cupro-Nickel. G. L. Lee. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 570-577.

Two copper-12% nickel alloys developed for marine fittings exhibit high strength and ductility, excellent corrosion resistance. 5 ref.
(Q-general; Cu-b, Ni-b, Al-b)

839-Q.* (French.) **Brittleness of Tantalum in Presence of Hydrogen at Atmospheric Temperatures.** Auguste Clauss and Hubert Forestier. *Comptes Rendus,* v. 246, June 9, 1958, p. 3241-3243.

When traces of dissolved oxygen are present in lattice, Ta reveals abnormal brittleness during deformation in presence of H; decrease of tensile strength varies with speed of application of load. If load in excess of break load of Ta wire in presence of H is applied to wire in vacuum, subsequent admission of H does not cause rupture. Study of modulus of torsion reveals that H does not affect domain of elastic deformations. (Q26s, 2-66; Ta, H)

840-Q. (French.) **Cast Tensile Test Bars for Nonferrous Sand-Cast Alloys.** Dominique Arnaud and Andre Lefebvre. *Fonderie,* no. 145, Feb. 1958, p. 64-74.

At present, only machined tensile test bars are accepted in France for testing of nonferrous foundry products. Study was undertaken to show economies of time and money made possible by use of unmachined bars. As-cast as well as machined bars of eight Al alloys and two bronzes made with new metals (U-E8 and U-E10) were tested. Method of fabrication of bars. 13 ref. (Q27, S22; Al-f, Cu-s, 5-60)

841-Q.* (French.) **New Rheological Creep Model.** C. Crussard. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 375-382.

Proposed model has viscous "centers of creep" which interact elastically on each other. Application of force to one of these centers causes appearance of a transient order and a stationary regime. Calculations show that transient regime is represented by sum of exponential terms, for which observed parabolic laws provide a very close approximation. 11 ref. (Q3, U10e)

842-Q.* (Japanese.) **Hot Workability of Low Carbon Steel.** T. Akutagawa, Y. Michima, E. Asano and A. Suseki. *Engineering Research Institute of Tokyo University, Annual Report,* v. 6, Mar. 1958, p. 49-54.

Influence of Cu and Sn in carbon steel (0.08-0.20% C.) on the hot workability of special shaped steel. Three methods used for the test: hot bending test; hot rolling test; microstructure test. It was concluded that Cu and Sn in steel were concentrated at or near the surface through oxidation reaction; this becomes one of the chief reasons for surface cracks.
(Q23, Q4, M27; CN, Cu, Sn)

843-Q. Change of Strain Hardening Coefficient Accompanying Austenite-Martensite Transformation During Plastic Deformation. M. G. Gaidulov and V. D. Sadovskii. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 4-8. (Henry Brutcher, Altadena, Calif., translation no. 4214.)

Result of investigating the increased tensile strength of austenitic steels in which plastic deformation is attended by transformation from austenite to martensite. The character of the change in the stress coefficient is directly bound to the resistance of austenite-to-martensite transformation. Development of martensite during plastic deformation results in higher stress coefficient. There is a mutual bond between plastic flow and martensitic transformation. 14 ref.
(Q25, Q27a, N8p; SS)

844-Q.* Regularities in Creep and Hot-Fatigue Data. A. Graham and K. F. A. Walles. *Aeronautical Research Council,* C.P. no. 379, 1958, 25 p.

A theory is advanced to analyze data in the creep-rupture and hot fatigue data of engineering materials. The theory enables data for different times and temperatures to be classed together, thereby providing information over a much greater temperature range. An underlying numerical pattern common to all the widely different group VIII materials considered shows through the experimental scatter. 6 ref. (Q3, Q7)

845-Q.* Fatigue Properties of Two Aluminum Die-Casting Alloys. G. W. Stickley and J. L. Miller. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 292-299.

Results of reversed bending and axial-stress fatigue tests of 218 and 380 Al die-casting alloys at room temperature, and of reversed bending tests at temperatures up to 500° F. 6 ref. (Q7, Al-b)

846-Q. Comparison of Properties of Liquid and Air-Quenched Pearlitic Malleable Irons. Pt. 2. Duplex, Cold-Melt Process and Alloyed Pearlitic Malleable Irons. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 304-313.

Hardening by liquid quenching, and then drawing (tempering) shown to be a successful means for producing the ASTM 60003 and 80002 grades in all foundries. Air quenching and drawing (tempering) is successfully used to produce ASTM 60003 and lower yield strength grades such as 53004, 48004 and 45007. (Q-general; CI-s)

847-Q. Effects of Geometry on the Properties of Gun-Metal (88-8-4) Castings. W. H. Johnson. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 314-318.

The gun-metal castings exhibited pronounced edge-to-center effects, with the mechanical properties varying from values higher than for the test bars to values considerably lower. Vacuum degassing did not always improve the mechanical properties, and in some cases it had a deleterious effect.
(Q-general, E25s 3-73; Cu-s)

848-Q. Some Observations on Galvanizing Embrittlement of Malleable Iron. R. W. Sandelin. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 409-418.

The galvanizing embrittlement of malleable iron is directly related to its chemical composition, namely, the phosphorus and silicon content. A pretreatment consisting of heating to 1200° F., followed by water quenching, before galvanizing, will eliminate the possibility of embrittlement. 6 ref. (Q26s, L16; CI-s)

849-Q. Effect of Carbon and Manganese on Properties of Constructional Steels for Dynamic Loading Applications. R. D. Engquist. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 419-423.

(Q25; ST, C, Mn, 2-60)

850-Q.* Fracture Characteristics of Copper-Base Alloys. N. C. Howells and E. A. Lange. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 462-468.

Fracture characteristics of 15 Navy Cu-base alloys. Interrelationships between Charpy V energy, tensile elongation and notch ductility for these alloys. (Q26; Cu-s)

851-Q.* The Effect of Cold Work on the Irradiation Stability of Beta Heat Treated Uranium. W. R. Thomas. *Atomic Energy of Canada Ltd.,* CRMET-766, 24 p.

Effect of cold work on the irradiation stability of beta heat treated uranium has been measured for amounts of cold work varying from 0.70 to 5.8%. Cold work was introduced into full length NRX rods by cold drawing through a circular die. It was found that the surface finish of the rods after drawing was excellent and that the rate of irradiation growth as a function of cold work can be expressed by an equation. 8 ref.
(Q-general, P10d, 2-67, 3-68; U, 2-64)

852-Q.* Properties Affecting Suitability of 9 Per Cent Nickel Steel for Low-Temperature Service. T. N. Armstrong, J. H. Gross and R. E. Brien. Digest from "ASME-AWS Joint Metals Engineering Conference, Paper 58-MET-3". *Mechanical Engineering,* v. 80, July 1958, p. 81.

Charpy values for both keyhole and V-notch specimens are reported for test temperatures down to −320° F. and results for drop-weight tests on ½ and 1 in. plate at −320° F. Welding procedures using both the metal-arc process with covered electrodes and the inert-gas metal-arc process; test values for welds made by each process. Fatigue properties and comparison of plastic fatigue strength with that of several other pressure vessel steels.
(Q-general, 2-63; ST, Ni)

853-Q.* Design Values for Thermal Stress in Ductile Materials. B. F. Langer. Digest from "ASME-AWS Joint Metals Engineering Conference, Paper 58-MET-1". *Mechanical Engineering,* v. 80, July 1958, p. 81.

Methods proposed for application of strain-cycling data to practical design problems involving thermal stress. Multi-axial stress conditions; combined steady and alternating stress; cumulative damage. When the calculated thermal stress exceeds the yield stress of a ductile material, some of the commonly used concepts, such as the Soderberg diagram, must be modified.
(Q25p, 17-51)

854-Q.* Pressure Equipment for Low-Temperature Service. C. K. Soderberg. Digest from "ASME-AWS Joint Metals Engineering Conference, Paper 58-MET-9". *Mechanical Engineering,* v. 80, July 1958, p. 82.

Four most common test categories —stress level in path of advancing crack, fracture appearance, ductibility and impact energy. Materials and fabrication. An approach for the avoidance of brittle failure is suggested. (Q26s, T26q, 2-63)

855-Q.* Factors Affecting Residual Stress in Electrodeposited Metals. Pt. 4. Joseph B. Kushner. *Metal Finishing,* v. 56, July 1958, p. 52-55, 59.

An equation has been proposed giving the relationship of residual stress with thickness of deposit. There appears to be no relation between the known effect of anions on overvoltage and the residual stress in Ni deposits which apparently invalidates the excess energy type theories. 63 ref. (Q25h, 8-62; Ni)

856-Q.* Temperature Dependence of Internal Friction in Germanium. P. D. Southgate. *Physical Review,* v. 110, May 15, 1958, p. 855-857.

The internal friction of Ge measured as a function of temperature at 100 kc/sec. There is a peak at 420° C. and little further rise to within a few degrees of the melting point. A specimen strained in tension shows a rapid rise with temperature above 500° C. Results compared with those of Kessler and it is suggested that the high-temperature rise found in all his specimens is due to thermal stressing. A small peak at 770° C. is attributed to the presence of oxygen in the Ge.
(Q22, 2-61; Ge)

857-Q.* The Effect of Neutron Irradiation on the Impact Properties of En2 Mild Steel. I. L. Mogford, A. T. Churchman and D. Hull. *United Kingdom Atomic Energy Authority,* AERE M/R 2485, Feb. 1958, 10 p.

The impact properties of En2 mild steel have been measured after irradiation with neutrons to a maximum integrated dose of 9.3×10^{19} neutron cm^{-2}. The increase in the transition temperature is approximately proportional to the cube root of the dose. At the maximum dose the rise in transition temperature is 75° C. There is a reduction in the energy absorbed in ductile fracture after irradiation which is approximately 50% for specimens given high doses. 16 ref. (Q6n; Cn, 2-67)

858-Q.* A Theory for Preheating of Plain, Low-Carbon Steels. E. Paul Degarmo. *Welding Journal,* v. 37, Mar. 1958, p. 93s-96s.

Six possible effects of preheating —reduced microhardness, increased width of the heat affected zone, reduced shrinkage stresses, changed hydrogen content, more favorable microstructure and reduced microcracking—are considered. From a consideration of the requirements for microcracking, retained austenite and hydrogen, a theory is developed which states that it is the elemination of retained austenite at low temperatures, due to the greatly reduced cooling rate below 400° F., which results from preheating, that accounts for the beneficial results obtained. 8 ref.
(Q25, Q29q, P10d, M27, F21; AY)

859-Q.* Evaluation of the Kinzel Test From Its Fracture Characteristics. R. D. Stout, W. J. Murphy and R. C. Westgren. *Welding Journal,* v. 37, Mar. 1958, p. 107s-113s.

The Kinzel test showed welding raises the ductility transition of steel by producing a trigger for cleavage-crack initiation in the vicinity of the weld. In the carbon steels tested, the coarse-grained region was usually the source of the cleavage crack; while in low alloy steel, initiation more commonly occurred in the intercritical zone. Preheating and the heat-input level were not effective in changing the transition temperature, but postheating restored much of the notch toughness lost by welding. The Kinzel test proved sensitive to the loading level at the instant of cleavage initiation. 3 ref.
(Q23p, K9r; ST)

860-Q.* Controlled Low-Temperature Hot Rolling as Practiced in Europe. R. W. Vanderbeck. *Welding Journal,* v. 37, Mar. 1958, p. 114s-116s.

Technique used by various mills in Europe which increased notch toughness in hot rolled products. Average improvement in the 15 ft-lb. V-notch Charpy transition temperature of 20 to 45° F. is possible.
(Q6, F23)

861-Q.* Fatigue Characteristics of Single-Lap Joints of AISI 347 Brazed With a Ni-Cr-Si-B-C Alloy. R. G. Aspden and W. Feduska. *Welding*

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

Journal, v. 37, Mar. 1958, p. 125s-128s.

Brazed specimen exhibited a fatigue endurance limit equivalent to the original annealed AISI 347 strip at room temperature, and 10% lower than the unbrazed material at 1100° F. Fatigue endurance limit of the strip tested to be 50 x 10^6 cycles with 31,600 psi. at room temperature and 31,000 psi. at 1100° F. Fatigue cracking of brazed strip occurred adjacent to the joint, rather than through the joint interface. 12 ref. (Q7; SS, *N*, *Cr*, *Si*, B, C, 7-52)

862-Q. A Creep Machine Under High Vacuum and for Low Stresses. A. Gautier. *Revue de Metallurgie*, v. 55, Jan. 1958, p. 9-16. (Iron and Steel Institute, Translation no. 919.)

Previously abstracted from original. See item 361-Q, 1958. (Q3, 1-53)

863-Q. The Classification of Steel Structures From the Point of View of the Danger of Brittle Fracture. K. Ruhl. *Schweissen und Schneiden*, v. 10, Feb. 1958, p. 39-44. (Iron and Steel Institute, Translation no. 1020.)

Previously abstracted from original. See item 342-Q, 1958. (Q26s, Q23r; ST, SGA-s)

864-Q.* (Czech.) **Strength of Bonded Light Metal Joints in Fatigue Testing.** Vladimir Gregor. *Zvaranie*, v. 7, May 1958, p. 135-141.

Results of fatigue strength tests made on single and double overlapping epoxy bonded joints, using thin sheets of Al-Mg-Cu alloys. Compares strength of adhesive bonds to riveted or spot-welded joints. (Q7a; Al, Cu, Mg, 7-58)

865-Q. (French.) **Fatigue Failure. Investigation of Damaged Parts of Vibrator Units.** *Soudage et Techniques Connexes*, v. 12, May-June 1958, p. 184-186.

Parts operate at a rate of over 10,000 strokes per min. Cracks were found at the junction between a 0.5% C steel tube and a 3% Ni steel semispherical tip, the weld being made on a backing ring. Failures result from very strong vibration sustained by the unit and defective welding. (Q7, 9-72; ST, 7-51)

866-Q.* (German.) **Behavior of Light Metal Alloys at Elevated Temperatures.** W. Jung-Konig and U. Zwicker. *Aluminium*, v. 34, June 1958, p. 337-345.

Uses published information and experimental data as basis for comparison of high-temperature properties of Al, Mg, and Ti alloys. Ti alloys $TiAl_3B_4$, $TiAl_7Mo_3$ selected as superior to other light alloys at temperatures up to 450 and 500° C. respectively. Above 250° C., sintered Al powder had higher strength than other Al and Mg alloys. 30 ref. (Q-general, 2-63; Al-b, Mg-b, Ti-f)

867-Q. (Japanese.) **Distribution of Pressed Surface Profiles. Pt. 4. Contact Between Rough Surfaces.** Akira Iwaki and Masaki Mori. *Japan Society of Mechanical Engineers, Transactions*, v. 24, Feb. 1958, p. 83-88.

Presents transformation law of distribution of roughness pressed on mirror surface. Investigates change of roughness in case of contact between two rough surfaces by comparing distribution curves of roughness pressed on mirror surfaces corresponding to roughness of pressing surface. Gap and contact ratio can be presumed by calculating both distribution functions of roughness. (Q9)

868-Q.* (Italian.) **Dependence of Elastic and Anelastic Parameters on Concentration in Antimony-Bismuth Alloys.** Kamal Matta and Italo Barducci. *Ricerca Scientifica*, v. 28, Mar. 1958, p. 533-540.

Electro-accoustical method was used to determine modulus of longitudinal elasticity, modulus of torsion, speed of propagation of elastic waves, coefficient of contraction and logarithmic decrement of oscillations. Comparison of results with those of similar study of Ag-Au alloys permits general conclusions regarding behavior of binary alloys characterized by complete miscibility in the solid state in all proportions. 4 ref. (Q21, Q22, 2-60; Sb, Bi)

869-Q.* (Russian.) **Mechanism of Brittle Failure in Steel.** B. S. Kasatkin. *Svarochone Proizvodstvo*, June 1958, p. 24-28.

Brittle failure is a two-stage process. The first stage is breaking down of the grains accompanied by plastic deformation and the formation of internal microcracks. In the second stage cracks develop on the thin surface layers, extending to the bottom of the break, and spreading crosswise to the partially deformed grains. 8 ref. (Q26s; ST)

870-Q.* (French.) **Mechanical Properties of the Isothermal Decomposition Products of Austenite in Three Construction Steels.** R. Potaszkin and K. Bar-Avi. *Revue de Metallurgie*, v. 55, Apr. 1958, p. 345-363.

Specimens of SAE 3140, 4140 and 1340 steels were studied in tempered as well as untempered state after transformation. In all cases, lower bainite was found to have mechanical properties comparable to those obtained by quench and temper; untempered upper bainite revealed low values for yield strength, reduction of area and impact strength. 6 ref. (Q-general, N8g, N8m; ST)

871-Q.* An Investigation of Plastic Stress-Strain Relationships Using Grooved Tensile Specimens. J. P. Ellington. *Journal of the Mechanics and Physics of Solids*, v. 6, July 1958, p. 276-281.

Determination of plastic potential of thoroughly annealed brass and copper. The brass was found to have a Mises potential (the strain-rate being proportional to the deviatoric stress); copper showed a deviation from this potential, presumably due to anisotropy. (Q25n; Cu, Cu-n)

872-Q.* Fracture Mechanism of Semi-Brittle Steels in Torsion. J. B. Hunt. *Journal of the Mechanics and Physics of Solids*, v. 6, July 1958, p. 321-326.

The petal-shaped pattern noticed on the fracture surface of certain mild steels tested in torsion led to investigation of the mechanism of a type of fracture hitherto assumed to be a conventional shear separation. It was found that the fracture sequence involved both tensile failure and sliding in shear. (Q26, Q1a; ST)

873-Q.* (English.) **Study of the Behavior at High Temperatures of Nodular Cast Irons Alloyed With Silicon.** T. Dumitrescu, Maria Nicolaid and Pamfil Iliescu. *Revue de Métallurgie, (Bucarest)*, v. 1, 1956, p. 33-53.

Nodular cast irons alloyed with Si, especially those with a Si content of 4.5-6%, are superior to Al cast irons and many oxidation resistant cast irons as regards mechanical properties, dimensional stability at high temperatures and resistance to oxidation. 8 ref. (Q-general, 2-60; CI-r, *Si*)

874-Q. Set-Resistance of Spring Steel Strips at Room Temperature. V. Ya. Zubov and S. V. Grachev. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 20-23. (Henry Brutcher, Altadena, Calif., Translation no. 4218.)

Setting characteristics of spring steel strips bent into rings of different types. Silicon steel alloyed with W and Mo (EI 722) has considerably greater resistance to relaxation than steels EI 142 and V 10 A with lower Si content. Three different kinds of hardened unannealed steel showed lower resistance to setting. Evidently this was due to the decomposition of martensite under prolonged active tension. 6 ref. (Q3, Q21; ST, SGA-b)

875-Q. (French.) **Fatigue Strength of Some Machine Components and Detailed Study of Scatter of Results.** Luigi Locati. *Revue de Métallurgie*, v. 55, Apr. 1958, p. 364-374.

6 ref. (Q7a, S12, T7)

876-Q.* (French.) **Study of Hot Plastic Deformation of a Soft Iron and a Stable Nickel-Chromium Austenite.** R. Tamhankar, J. Plateau and C. Crussard. *Revue de Métallurgie*, v. 55, Apr. 1958, p. 383-400.

Mechanical properties and structural modifications accompanying deformation at high temperature studied by tension, torsion, creep and internal friction tests. Portevin-le Chatelier phenomenon resulting from segregations produced during course of tests and its influence on mechanical properties. General equation for creep based on deformation, load, temperature and time factors. Heats of activation of creep over a wide range of temperature. Slip and intercrystalline decohesion become preponderant above equicohesive temperature. Role of intercrystalline slip, slip and diffusion at grain boundaries, polygonization and recrystallization. 10 ref. (Q24, Q3; Fe, SS-e)

877-Q. (German.) **Theory of Transient Creep in Metal Crystals.** Hubert Blank. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 301-308.

Attempt to deduce the formulas for transient creep from a displacement model. A certain relation exists between the model and the hardening properties of cubic face-centered crystals. Creep occurs in dependence of a parameter and resulting in parabolic, hyperbolic or logarithmic velocity laws. Starting conditions for creep are developed mathematically. At higher temperatures elastic influences produce superhyperbolic curvature. 21 ref. (Q3)

878-Q* (German.) **Testing Sheet Metals With the Cup Drawing Test.** Alfred Krisch, Karl-Heinz Muhr and Wilhelm Schluter. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 313-320.

Attempt to evaulate the cup test for determination of drawing properties of sheet metals. Various steels were tested but did not provide sufficiently clear results to differentiate between their properties. Tables and diagrams on thickness, drawing forces, chemical composition. 13 ref. (Q23q, 1-54; ST, 4-53)

879-Q. (German.) **Comparison of Characteristics of Structural Alloy Steels After Heat Treatment and Intermedi-**

ate Heat Treatment. Jercy Tymowski. *Bergakademie,* Mar. 1958, p. 209-212.
(Q-general, 2-64; ST)

880-Q. (German.) **Influence of Alloying Elements on Retention of Hardness.** Milos Pridal. *Bergakademie,* Mar. 1958, p. 212-213.
(Q29n, 2-60; AD-n)

881-Q. (German.) **Studies of Internal Strain of Fatigue.** Miroslav Holy. *Czechoslovak Journal of Physics,* v. 8, 1958, p. 108-111.
(Q7)

882-Q. (German.) **Characteristics of Some Steels for High-Temperature Service.** Albert von den Steinen. *Energie,* May 1958, p. 194-198.
(Q-general, 2-62; ST)

883-Q. (German.) **Determination of Damping Capacity.** A. Troost. *Industrie-Anzeiger,* May 2, 1958, p. 21-23.
12 ref. (Q8g)

884-Q.* (German.) **Changes in Material Properties After Exposure to Radiation.** K. Sagel. *Metall,* v. 12, May 1958, p. 353-362.
Basic effects and some of the changes in metallic, nonmetallic and organic substances. The changes in metals are mainly effected by radiation causing the so-called Frenkel defects, thus enhancing the hardness of crystals and the diffusion properties. 35 ref.
(Q26s, Q29n, N1, 2-67)

885-Q.* (German.) **Fatigue Properties of the Alloy $TiAl_6V_4$.** U. Zwicker. *Metall,* v. 12, May 1958, p. 381-386.
Various Ti alloy specimens were subjected to essentially the same heat treatment (2 hr. at 700° C., air cooled) and the same load (22 kg. per sq. mm. and 14 kg. per sq. mm.) at 450° C. for 1000 hr. Creep velocity, elongation and hardness were recorded. Effects studied were: type of Ti sponge used, chemical composition, (particularly V and Al contents) texture, heat treatment, hydrogen content. 16 ref.
(Q-general, 2-60, 2-64; Ti, *Al, V*)

886-Q. (German.) **Influence of Inherent Tension on Buckling of Steel Bearings.** B. Thuerlimann. *Schweizer Archiv,* Dec. 1957, p. 388-404.
16 ref. (Q28g, T7a; ST)

887-Q. (German.) **Notch Impact Strength of Nickel.** P. Kuhn. *Schweizer Archiv,* Feb. 1958, p. 59-62.
3 ref. (Q6n; Ni)

888-Q. (German.) **Properties and Fundamentals of the Production of Nodular Cast Iron.** W. Patterson. *VDI-Berichte,* v. 27, 1958. p. 7-10.
(Q-general, E-general; CI-r)

889-Q. (German.) **Influence of Temperature on Impact Tension of Nodular Cast Iron.** A. B. Everest. *VDI-Berichte,* v. 27, 1958, p. 19-22.
8 ref. (Q6n, 2-61; CI-r)

890-Q. (German.) **Electronic Theory of Mechanical Strength.** G. M. Schwab, J. Tsipuris and M. Tsipuris. *Zeitschrift für Physikalische Chemie,* v. 14, Jan. 1958, p. 66-75.
(Q-general, M25)

891-Q. (Japanese.) **High-Strength Copper Alloys; Four High-Strength Copper Alloys Containing Titanium.** Y. Mishima and S. Morikawa. *Engineering Research Institute in Tokyo University, Annual Report,* v. 16, Mar. 1958, p. 101-105.
Mechanical tests including abrasion in contact with rotating metallic drum, as well as spring limit measurement carried out on Cu-Ti-Be and Cu-Ti-Ag alloys.
(Q-general, Cu-b, *Ti,* SGB-a)

892-Q. (Japanese.) **Distribution of Deformation Profiles on Contact of Rough Surfaces.** Akira Iwaki and Masaki Mori. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 83-93.
Law of distribution of roughness to mirror surface developed; coefficient of changing roughness given. 11 ref. (Q9, S15)

893-Q.* (Spanish.) **Welding Stresses in Ship Hulls and Welded Structures.** A. Audige. *Ciencia y Tecnica de la Soldadura,* v. 8, Mar-Apr. 1958, 8 p.
Residual stresses can contribute to crack initiation and/or propagation in presence of any kind of "notch" in weld, but are generally not harmful of and by themselves. Suggestions for reducing influence of these stresses. 16 ref.
(Q25h, T22g, 7-51)

894-Q.* **Temper Embrittlement in Nodular Cast Irons.** G. N. J. Gilbert. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 49-65.
Ferritic nodular cast irons and malleable cast irons of appropriate composition, which have previously been slowly cooled from about 1202° F., are embrittled when quenched from about 842° F. By embrittlement is meant the raising of the transition temperature. Irons similarly treated but slow cooled from 842° F. instead of quenched have their ductility progressively increased during the slow cooling cycle. 13 ref. (Q23r, Q26s; CI-r)

895-Q. **Determination of Stress-Strain Properties at High Rates of Strain.** R. J. MacDonald, R. L. Carlson and W. T. Lankford. *Engineering Sciences, Technical Paper,* v. 4, no. 1, 1957, p. 163-170.
11 ref. (Q25n, Q22; ST)

896-Q. **Wear Resistance of Some Nickel-Base Alloys.** R. A. Kozlik. *Foundry Trade Journal,* v. 104, June 12, 1958, p. 717-718.
(Q9; Ni-b)

897-Q. **Raising the Physicals of 6063 Alloy Extrusion Billet.** James K. McLaughlin. *Modern Metals,* v. 14, July 1958, p. 56, 58, 60, 62.
Research reveals partial homogenization achieved with induction heating.
(Q29, Q28g, 2-64; Al-b, 4-58)

898-Q. **The Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Group 2. Experimental Equipment and Technique of Long-Time Creep Testing.** K. G. Olsson. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 679-685. (Iron and Steel Institute, Translation no. 340.)
Previously abstracted from original. See item 407-Q, 1958.
(Q3; SS, 1-53)

899-Q. **The Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Group 5. Scatter of Results of Long-Time Creep Tests.** Wilhelm Schluter. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 717-730. (Iron and Steel Institute, Translation no. 843.)
Previously abstracted from original. See item 412-Q, 1958.
(Q3, 1-54; SS)

900-Q. **Machine for the Study of Creep in a Higher Vacuum and With Low Constraint.** A. Gautier. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 9-16. (Iron and Steel Institute, Translation no. 919.)
Previously abstracted from original. See item 361-Q, 1958. (Q3, 1-53)

901-Q. (English.) **Mechanism of Friction Between Metal Surfaces. Pt. 2. The Fine Mechanism of Static Friction.** Gennosuke Yoshimoto and Tadasu Tsukizoe. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 19-22.
(Q9p)

902-Q. (English.) **Creep of Low Carbon Steel Under Fluctuating Stresses.** Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Kiyotsugu Ohji. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 31-34.
(Q3, CN-g)

903-Q. (English.) **Theoretical Study of Effect of Pressing and Stretching on Springback.** Yasuhisa Tozawa. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 49-56.
"Springback" is defined as the distortion caused by the elasticity inherent in the material after workhardening. (Q22n; ST)

904-Q. (French.) **Study of Strains Set Up in High-Chromium Steels by Quenching.** C. Bovirosa. *Métallurgie et la Construction Mécanique,* v. 90, June 1958, p. 473-481.
Origins and thermomechanical history of high-chromium steels for tools used for cutting magnetic circuit sheets. (Q25p, J26; TS, *Cr*)

905-Q. (German.) **Special Changes of Characteristics in the Alloy Series Co_3V-Ni_3V as a Function of Heat Treatment.** Werner Köster and Franz Sperner. *Bergakademie,* Dec. 1957, p. 614-616.
Electrical resistance; Hall constant; Vickers' hardness; modulus of elasticity.
(Q-general, P15, 2-64; Co, Ni, V)

906-Q. (German.) **Irregular Deformation of Metals.** A. T. Balewsky. *Comtes Rendus de l'Academie Bulgare des Sciences,* no. 6, Nov-Dec. 1957, p. 465-468.
Variation of elastic deformation with stress. 15 ref. (Q21)

907-Q. (German.) **Relative Hardness and Degree of Aging in Assessment of Gray Cast Iron.** Wilhelm Patterson. *Giesserei,* v. 45, July 3, 1958, p. 385-387.
5 ref. (Q29n, N7a; CI-n)

908-Q. (German.) **Strength Characteristics of Test Bars Cast-On and Cut From Casting.** Heinrich Resow and Werner Trommer. *Giesserei,* v. 45, July 3, 1958, p. 387-397.
Sampling from steel castings; location of test bars when casting; mechanical properties of test strips cut from casting. 6 ref.
(Q-general, S12h; ST, 5-60)

909-Q. (German.) **Notch Impact Strength of Steel Mine Supports.** Wilhelm Schaefer. *Glückauf,* no. 5-6, Feb. 1, 1958, p. 176-179.
5 ref. (Q6n; ST)

910-Q. (German.) **Lubrication and Wear.** G. Fleischer. *Machinenbau-Technik,* v. 7, Apr. 1958, p. 229-238.
(Q9, 18-73)

911-Q. (German.) **Flaws in Steel and Their Causes.** *Technik und Betrieb,* v. 10, June 1958, p. 86-88.
Brittleness and its control.
(Q26s; ST)

912-Q. (German.) **High-Temperature Stability of Nodular Cast Iron.** H. Stelzenmüller. *VDI-Berichte,* v. 27, 1958, p. 61-69.
Test in hot drawing of unalloyed nodular cast iron comparable to behavior of unalloyed steels. The hot drawing stability decreases gradually until approximately 425° C., afterwards faster. (Q23q, 2-62; CI-r)

913-Q. (Italian.) **Progress in the Field of Heat Resistant Alloys and Recent Industrial Applications.** *Ingegnere,* v. 32, Apr. 1958, p. 319-321.
(Q-general, 17-57; SGA-h)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

914-Q. (Japanese.) **Precipitation Hardened Stainless Steels.** S. Kawahata and Y. Sato. *Metals*, v. 28, June 1958, p. 409-416.

Microstructure and mechanical properties of precipitation hardened stainless steel alloys. (Q-general, M27; SS)

915-Q. (Japanese.) **Low-Nickel, High-Manganese Stainless Steel.** S. Kinshiki. *Metals*, v. 28, June 1958, p. 417-420.

Mechanical and physical properties of AISI 201, 202, 301 and 302 steels compared. (Q-general, P-general; SS)

916-Q. (Japanese.) **Characteristics of Vacuum Melted Stainless Steel.** S. Yamamoto and Y. Hatsuk. *Metals*, v. 28, June 1958, p. 421-423.

Mechanical and physical properties of AISI 304, AISI 316L and AISI 347 steels compared. (Q-general, P-general, D-general, 1-73; SS)

917-Q. (Russian.) **Effect of Mechanical and Heat Treatment on Mechanical Properties of Metal Surfaces.** B. M. Rovinskii and V. I. Mokeeva. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 331-339.

9 ref. (Q-general, 264, 3-68)

918-Q. (Russian.) **Wear Resistance of Magnesium Cast Iron.** A. D. Ushakov. *Liteinoe Proizvodstvo*, May 1958, p. 17-18.

Magnesium iron with spheroidal graphite structure possesses great strength and exceptional wear resistance and can be substituted for nonferrous alloys for friction resistance purposes. (Q9p; CI-r)

919-Q. (Russian.) **Effect of Welding Thermal Cycle on Mechanical Properties of Low-Alloy Steels in Zone Adjacent to Weld.** G. N. Klebanov. *Svarochnoe Proizvodstvo*, May 1958, p. 5-8.

(Q-general, 2-61; AY, 7-51)

920-Q. (Russian.) **Determination of Degree of Plastic Deformation of Cut Metal.** A. M. Rozenberg and G. L. Kufarev. *Vestnik Mashinostroeniya*, v. 38, June 1958, p. 49-52.

7 ref. (Q24, G17)

921-Q. (Russian.) **Dynamic Method for Measuring Relationship of Modulus of Elasticity to Temperature of Iron, Using Specially Constructed High-Vacuum Device.** R. I. Garber and A. I. Kovalev. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 477-479.

6 ref. (Q21a, 1-54, 2-61; Fe)

922-Q. (Russian.) **Device for Bending Secured Objects to Test Endurance Limit of Metals.** B. A. Avdeev. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 508-510.

(Q7g, 1-53)

923-Q. (Russian.) **Mechanical Device for Measurement of Degree of Plastic Deformation of Steel.** E. G. Dolmatov and I. I. Sitnikov. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 629-631.

4 ref. (Q24, 1-54; ST)

924-Q.* **Report on the Properties of Titanium Alloys at Elevated Temperatures.** F. R. Schwartzberg, F. C. Holden, H. R. Ogden and R. I. Jaffee. Battelle Memorial Institute, Titanium Metallurgical Laboratory, TML Report no. 82, Sept. 10, 1957, 216 p.

Detailed analysis of short-time elevated-temperature properties, elevated-temperature creep and rupture properties; thermal stability. (Q3; 2-62, Ti-b)

925-Q.* (French.) **Several Effects of Chemical Composition on the Mechanical Properties of Steel.** G. Mayer and L. H. Toft. *Revue du Nickel*, v. 24, Apr-May-June 1958, p. 27-38.

Variations in chemical composition did not have much effect on tensile properties. Additions of Ni, Mo and V improved the impact properties, while Cr and Mn had an unfavorable effect. Effects were more pronounced in bainitic than martensitic structures. 5 ref. (Q27, Q6; AY, Ni)

926-Q.* (Russian.) **Fatigue Strength of Large Section Element Electro-Slag Welds.** I. V. Kudryavtsev, N. E. Naumchenkov and N. M. Savvina. *Svarochnoe Proizvodstvo*, Apr. 1958, p. 15-19.

Investigation of metallurgical and mechanical properties of electro-slag welds leads to following conclusions: welds of mild steel subjected to mechanical working have high endurance limit; the endurance limit of welds not subjected to thermal treatment is only slightly lower than that of base metal. Investigation discloses effect of size on fatigue strength. Endurance limit of cylindrical steel elements with 150 to 200 mm. diameter is 25% lower than that of objects with 20 mm. diameter. 5 ref. (Q7a, 2-64, 2-68; ST, 4-60, 7-51)

927-Q.* **Compressive Strength and Creep of 17-7 pH Stainless-Steel Plates at Elevated Temperatures.** Bland A. Stein. *National Advisory Committee for Aeronautics, Technical Note 4296*, July 1958, 36 p.

Compressive strength test results from room temperature to 1000° F. and compressive creep test results from 700 to 1000° F. for plates of 17-7 pH stainless steel, condition TH 1050. 8 ref. (Q28g, SS; 2-62)

928-Q. **Tentative Proposal for the Origin of Internal Friction Peak Observed in Cold Worked Iron.** Noboru Okazaki. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 67-70.

Peak may be originated in the behavior of face-centered-cubic structure. 23 ref. (Q22, M26c; Fe)

929-Q. **Relaxation Phenomena on the Double Transition in Charpy Test.** Noboru Okazaki. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 71-77.

Upper and lower transition may be associated with the critical temperature of FCC→BCC and BCC→FCC structural changes, respectively, at the stress state. 27 ref. (Q6, N4; ST)

930-Q. **On the Local Distribution of Strain in Plastically Deformed Aluminum Crystals. Pt. 3.** Zenji Nishiyama and Satohiro Hayami. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 129-143.

5 ref. (Q24; 14-61, Al)

931-Q. **Effect of Fatigue Crack on Static Strength: 2014-T6, 2024-T4, 6061-T6, 7075-T6 Open-Hole Monobloc Specimens.** G. E. Nordmark and I. D. Eaton. *National Advisory Committee for Aeronautics, Technical Note 1428*, May 1957, 22 p.

Static tensile test results are presented for specimens of 2014-T6, 2024-T4, 6061-T6 and 7075-T6 Al alloys containing fatigue cracks. The 6061-T6 alloy specimens were least susceptible to the crack and the 7075-T6 alloy specimens most susceptible. (Q7, Q27a; Al-b)

932-Q. **Creep Behavior of Structural Joints of Aircraft Materials Under Constant Loads and Temperatures.** L. Mordfin and A. C. Legate. *National Advisory Committee for Aeronautics, Technical Note 3842*, Jan. 1957, 53 p.

Results of 55 creep and creep-rupture tests on structural joints. Methods utilize creep data on the materials of the joint in tension, bearing and shear. (Q3m, T24a)

933-Q. **The Fatigue Strength of Aluminum Alloy Lugs.** J. Schijve and F. A. Jacobs. *National LuchtLab. Amsterdam Rap. M. 2024*, Jan. 1957, 20 p.

Fatigue diagrams established for unnotched specimens and two types of lugs of 2024-T Al alloy. Different factors which may effect the fatigue behavior of lugs. (Q7a; Al-b)

934-Q. **Formation of Fatigue Cracks.** W. A. Wood. *Philosophical Magazine*, v. 3, July 1958, p. 692-699.

Contours of the slip bands produced by fatigue straining of metals viewed by a process of taper-sectioning and optical microscopy which permits effective magnifications of some 20,000 times. (Q7g; Cu)

935-Q. (English.) **Theory and Practice in Steel Construction.** Fritz Stussi. *Acier-Stahl-Steel*, no. 2, 1958, p. 84-90.

Mathematical analysis in design of structures; mechanical properties of steel. (Q25, Q7; ST)

936-Q. (French.) **Rough Tensile Tests for Nonferrous Sand Castings.** A. Lefebvre and D. Arnaud. *Fonderie Belge*, v. 28, Apr. 1958, p. 119-122.

(Q27a; Cu-b, 5-60)

937-Q. (German.) **Emcotest—a New Universal Hardness Tester.** Tschirch and F. Gärtner. *Fertigungstechnik*, v. 8, May 1958, p. 225-228.

Tester with spring coupling for direct hardness measuring. (Q29)

938-Q. (German.) **Influence of the Hardening Process on the Durability of Circumference Hardened Gears.** Heinz Glaubitz. *Industrieblatt*, v. 58, June 25, 1958, p. 217-221.

15 ref. (Q9n, T7a; 2-64)

939-Q. (German.) **Rapid Testing of Various Types of Steel.** H. Haberhauer. *Maschinenbau*, Apr. 1958, p. 107-108.

Fracture test, spark test, etch test. (Q26, S10s, M20q)

940-Q. (German.) **Flaking of Steel.** F. Feeg. *Rundschau*, Feb. 1957, p. 470-474.

55 ref. (Q23; ST, 9-70)

941-Q. (Russian.) **Methodology of Determining Crack Sensitivity of Materials.** B. A. Drozdovsky and Ya. B. Friedmann. *Zavodskaya Laboratoriya*, v. 21, 1955, p. 579-590.

Crack sensitivity of a high-strength steel annealed and tempered at 200 or 510°, and heat-treated isothermally in various ways. Determination of the breakdown stress in static bending was made on notched samples, as well as on samples with cracks produced by preceding cyclic impact loading, and other methods. (Q26q; AY, 9-72)

Corrosion

436-R.* **Corrosion-Resistance of Spheroidal-Graphite Iron.** F. L. LaQue. *Foundry Trade Journal*, v. 104, June 12, 1958, p. 711-714.

Galvanic behavior; resistance to acid corrosion; corrosion by sea water; atmospheric corrosion; underground corrosion. (R-general; CI-r)

437-R. Rate of Oxidation of Copper in Nitric Acid. N. N. Milyutin and A. I. Shultin. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 57-60. (Translation by Consultants Bureau, Inc.)

Increase of temperature greatly increases the oxidation rate of Cu without affecting the linear relationship between the logarithm of the oxidation rate and the potential. The step which determines the oxidation rate is the electrochemical reaction at the Cu surface at moderate nitric acid concentrations, and probably the diffusion of oxidant to the surface at nitric acid concentrations above 11 molar. 9 ref. (R1h, R6g; Cu)

438-R.* Iridium as a High-Temperature Material. F. D. Richardson. *Platinum Metals Review*, v. 2, July 1958, p. 83-85.

Iridium crucibles were completely resistant to attack by Pb at 1000 to 1500° C. The crucibles lost weight slightly during use and became etched in appearance, whether they held slags or metal. The metal grains so revealed ranged up to 1 mm. across. Typical losses of Ir were: 0.0002 g. into 18 g. lead in 444 hr. at 1000° C.; 0.0014 g. into 20 g. slag and 20 g. lead in 144 hr. at 1000° C. 6 ref. (R6m; Ir, Pb)

439-R.* Behavior of the Platinum Metals at High Temperatures. A. R. Powell. *Platinum Metals Review*, v. 2, July 1958, p. 95-98.

Behavior of Pt, Rh and Pd in oxygen at high temperatures. Pt is the most, and Pd the least, volatile up to 1200° C., whereas at 1300° C. there is relatively little difference in the volatility of all three. The volatility of Pt in oxygen at 900-1100° C. is appreciably reduced by alloying it with Pd or Rh. 9 ref. (R1h, 2-62; EG-c)

440-R.* Corrosion of Mild Steel in Alkaline Pulping Liquors. Pt. 1. Kraft White Liquor. Richard B. Kesler and James F. Bakken. *Tappi*, v. 41, Mar. 1958, p. 97-102.

The effect of the presence of appreciable quantities of sodium chloride, sodium sulphate and sodium carbonate in kraft white liquor on the corrosion rate of mild steel in white liquor. 11 ref. (R7p, T29R; CN)

441-R. A Basic Study of Corrosion of Magnesium. R. R. Addiss. Cornell University. (Wright Air Development Center.) *U. S. Office of Technical Services*, PB 131662, Dec. 1957, 57 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.50.

Structure of the surface; process of formation and structure of surface films appearing during corrosion. Attempts to obtain a perfectly clean surface, both by cleaning a contaminated surface and by producing a new, clean surface in vacuum. Studies of oxidation of surfaces covered with the "first film", aimed at measuring the oxidation rate and investigating the relative crystallographic orientation of the metal and the oxide. (R-general; Mg)

442-R.* (German.) **Investigation of Sulphur Attack on Nickel and Nickel Alloys.** Irmtraud Pfeiffer. *Zeitschrift für Metallkunde*, v. 49, May 1958, p. 267-275.

Kinetics of sulphurizing reaction at 620°. Rate of sulphide formation is dependent on alloying additions. Microscopic study of sulphide layers; intercrystalline corrosion. (R7k, 2-60; Ni)

443-R.* (Italian.) **Electron Microscopic Examination of Oxide Film Formed on Aluminum by Hot Oxidation.** M. Paganelli. *Alluminio*, v. 27, Apr. 1958, p. 159-164.

Film formed on Raffinal annealed at about 620° C. is gamma Al_2O_3, cubic spinel. Under microscope this film presents a pseudo-radiated structure. Hot oxidation figures are true corrosion figures composed of pits having walls parallel to planes (100) of Al. 11 ref. (R1h, M27; Al)

444-R.* (Japanese.) **Aluminum and Aluminum Alloys in the Wine and Brandy Industry. Pt. 2. Corrosion of Aluminum Alloys in Alcohol and Acid Solution.** Morinaga Takuichi, Zaima Shigeo and Kagami Motoo. *Light Metals*, no. 30, May 1958, p. 26-33.

Specimens are dipped in alcohol diluted nearly equal to the alcohol concentration of raw brandy (or wine) and corrosion resistance examined. Specimens are next dipped in acid solution equal to the total acidity of raw brandy (or wine) and examined. Experiment was repeated for a mixed solution of alcohol and acid. 8 ref. (R7f; Al)

445-R.* (Japanese.) **Oxidation of Titanium-Iron Alloys in Air at High Temperatures.** Morinaga Takuichi, Miura Ishi and Takaai Tetuya. *Light Metals*, no. 30, May 1958, p. 42-52.

Investigated by measuring the weight change due to formation of oxidation layers. Specimens were Kroll Ti, 1% Fe, 2% Fe, 4% Fe and 8% Fe alloys heated in air at 600, 700, 800 and 900° C. The parabolic rate law was applicable to the oxidation of Kroll Ti and Ti-Fe alloys in the range 600-900° C. Activation energies were calculated. (R1h, 2-62; Ti-b, *Fe*)

446-R.* Theory and Practice of Boiler Water Treatment as a Means of Eliminating Corrosion and Scale. E. Quaade-Holm. *Corrosion Technology*, v. 5, July 1958, p. 213-214, 237.

An organic compound of high molecular weight not only eliminates scale-forming compounds, but removes old scale. The scale is physically removed rather than chemically decomposed. (R4c, R10b)

447-R.* Magnetic Treatment of Liquids for Scale and Corrosion Prevention. Theo Vermeiren. *Corrosion Technology*, v. 5, July 1958, p. 215-219.

Use of permanent magnetic field through which the water supply passes inhibits corrosion by transforming ferric hydroxide into magnetite, and causes dissolved minerals to remain in solution rather than to be deposited as scale. (R10g)

448-R.* Water Treatment for Domestic Hot-Water Supplies. C. C. Hanson. *Corrosion Technology*, v. 5, July 1958, p. 220-224.

Process using sodium calcium hexametaphosphate to prevent scale and corrosion. 5 ref. (R10b)

449-R.* Galvanic Corrosion. J. Boraston. *Inspection Engineer*, v. 22, May-June 1958, p. 50-56.

Causes, prevention of dissimilar metal corrosion, crevice corrosion, stay current corrosion. 4 ref. (R1a)

450-R.* The Effect of Surface Finish and Galvanic Coupling on the Corrosion Resistance of ASTM A-212 Carbon Steel in Primary and Secondary Water. L. R. Scharfstein. *Bettis Technical Review*, WAPD-BT-7, Mar. 1958, p. 52-57.

Neither surface finish nor galvanic coupling has any appreciable effect on corrosion resistance of carbon steel under reactor operating conditions. (R4c; CN)

451-R.* Corrosion of Shield Tank Materials in Lithium Chromate Solutions. E. Rau and K. Jakobson. *Bettis Technical Review*, WAPD-BT-7, Mar. 1958, p. 58-65.

Corrosion of shield tank materials (carbon steel, copper and lead) investigated in an inhibiting solution of lithium chromate. Standard test coupons and some soldered couples were tested in lithium chromate solution (1630 ppm.) with different pH values. Results indicate that the solution is effective for at least six months. (R10a; Cu, Rb, ST)

452-R. Copper Alloys for Corrosion Resistance. R. V. L. Hall. *Chemical Engineering Progress*, v. 54, June 1958, p. 51-55.

Combination of Cu alloys with ferrous or other alloys as duplex tube or clad components has excellent corrosion-resistant properties. (R-general; Cu-b)

453-R. Costly Liquid Chlorine Corrosion Overcome by Zirconium. *Chemical Processing*, v. 21, July 1958, p. 108-109.

(R6q; Zr)

454-R.* Thin Metal Film Corrosion Indicators. David Roller. *Corrosion*, v. 14, June 1958, p. 263t-267t.

Evaluates effectiveness of thin continuous iron films vacuum deposited on borosilicate glass and Plexiglass 55 in thicknesses ranging from 100 to 2500 Å, as corrosion indicators by tests made in atmospheres varying from 0 to 100% relative humidity; change in electrical resistance and visual appearance with corrosion. 8 ref. (R11a, Fe, 14-62)

455-R. Development of the Redox Probe Field Technique. F. E. Constanzo and R. E. McVey. *Corrosion*, v. 14, June 1958, p. 268t-272t.

Field technique developed to obtain oxidation reduction potentials of soils through use of probe. Compares Redox data to other standard corrosion criteria. (R8)

456-R.* Corrosion Resistance of Five Stainless Alloys in Nitric Acid Containing Chloride. I. I. Tingley. *Corrosion*, v. 14, June 1958, p. 273t-274t.

A number of stainless steels and the new alloy Ni-O-nel were tested in solutions 8N in HNO_3 and 0.2N in chloride. Stainless steels type 304L, 316, 309SCb and 329 were all resistant to the liquid and hot vapor, only type 329 showed good resistance to the condensing vapors from these solutions. The resistance of this steel was about 1000 times as great as that of type 304L, 316 and 309SCb. (R6g; SS)

457-R.* Laboratory Testing of Railroad Diesel Cooling System Corrosion Inhibitors. J. I. Bregman and D. B. Boies. *Corrosion*, v. 14, June 1958, p. 275t-279t.

Results of flask type and recirculating tests with several commercial and experimental corrosion inhibitors; effect of coupling between various metals, inhibitor dosage level, water composition and antifreeze. (R4, R10b, R11h)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

458-R.* Inhibition of Corrosion of Steel by Tetramethylammonium Bromide. Rudolph Macy, B. L. Harris, W. C. Bull and J. W. Eastes. *Corrosion,* v. 14, June 1958, p. 280t-282t.

Data on effectiveness of tetramethylammonium bromide and hexamine in inhibiting corrosion of steel by mustard, bis (2-chloroethyl) sulphide. Effect of inhibitor on rate of decomposition of mustard at 150° F. 11 ref. (R10f; ST)

459-R.* Inhibition of Titanium in Fuming Nitric Acid. J. B. Rittenhouse and C. A. Papp. *Corrosion,* v. 14, June 1958, p. 283t-284t.

Specimens of commerically pure Ti in Ti alloy containing 8% Mn were exposed to fuming nitric acid in tests at 30° C. of 28 days' duration in which a vapor space in the storage vessel contained varying amounts of oxygen. Results indicated no inhibition of titanium corrosion by oxygen but confirmed inhibiting effect of water at 1 to 2% by weight in fuming nitric acid. 4 ref. (R6g, R10b; Ti, *Mn,* O)

460-R.* Laboratory Studies Relating Mineral Quality of Water to Corrosion of Steel and Cast Iron. T. E. Larson and R. V. Skold. *Corrosion,* v. 14, June 1958, p. 285t-288t.

Influence of combination of various normal mineral constituents in domestic waters on rate of corrosion of cast iron and steel and on accumulation of corrosion products. Tests with air-saturated waters at room temperature with velocities of 0.1 to 1.0 ft. per sec. with pH control by CO_2 at 6.0 to 8.5. Ions considered include chloride, sulphate, bicarbonate and calcium. 6 ref. (R4, R11; CI, ST)

461-R. The Current-Voltage Relationship of Galvanic Anode Arrays in Cathodic Protection. L. J. Waldron and M. H. Peterson. *Corrosion,* v. 14, June 1958, p. 289t-294t.

Arrays of impressed current steel anodes of five different anode sizes and a steel sea wall acting as a cathode were used in investigating current outputs. Determined output current for driving potentials of 0.1, 0.2, 0.5, 0.7 and 1.0 volts between cathode and anode arrays. (R10d)

462-R.* Accelerated Condensation Corrosion Test for Evaluating Rust Preventives. E. A. Dieman and J. W. Gaynor. *Corrosion,* v. 14, June 1958, p. 302t-304t.

Apparatus and procedure employed in accelerated condensation corrosion test for evaluating effectiveness of rust preventives. Cooling to increase condensation on steel test panels and panel preparation procedure involving water treatment; decreased testing time and increased precision compared to results obtained in JAN-H-792 humidity cabinet tests. 5 ref. (R10b, R11k; ST)

463-R. Use of Magnesium Anodes to Protect Steel Mains. Harold C. Boone. *Corrosion,* v. 14, July 1958, p. 307t.

(R10d; 4-60, ST)

464-R.* The Activation and Inhibition of Corrosion of Metals by Metallic Cations. W. Roger Buck and Henry Leidheiser. *Corrosion,* v. 14, July, 1958, p. 308t-312t.

Survey of the corrosion by fruit and mineral acids at the boiling point in the presence of low concentrations of foreign metallic ions. Cations of the elements in groups II through V in the periodic table showed the highest tendency to decrease the rate of corrosion and the transition elements in group VIII showed the highest tendency to increase the rate of corrosion. 6 ref. (R6g, R7g, 2-66)

465-R.* Aqueous Corrosion of Uranium Fuel-Element Cores Containing 0 to 20 Weight Percent Zirconium. Daniel R. Grieser and Eugene M. Simons. *Corrosion,* v. 14, July 1958, p. 313t-318t.

Design and operation of a windowed autoclave system employed in the study of corrosion by pressurized hot water. The device has been used to obtain time-lapse motion pictures of the swelling and rupture of deliberately defected zirconium-clad uranium specimens. A method is described by which corrosion rates were calculated from pressure and temperature measurements. (R4, R11h; U, Zr)

466-R.* Inter Society Corrosion Committee Glossary of Corrosion Terms. Pt. 2. *Corrosion,* v. 14, July 1958, p. 319t-320t.

(R-general; 11-67)

467-R.* The Behavior of Steels in Hydrogen Sulfide Environments. L. W. Vollmer. *Corrosion,* v. 14, July 1958, p. 324t-328t.

Spontaneous cracking of steels in deep high-pressure condensate wells producing gas containing hydrogen sulphide. The susceptibility of most constructural steels to sulphide-stress cracking can be minimized, if not eliminated, by appropriate heat treatment which must include tempering at a temperature not less than 1150° F. and by limiting the maximum mechanical properties to predetermined levels. 11 ref. (R1d, R7k; ST)

468-R.* Surface Area Relationships in Polarization and Corrosion. Milton Stern. *Corrosion,* v. 14, July 1958, p. 329t-332t.

Polarization behavior of surfaces containing regions which exhibit different overvoltage parameters for the same reaction. The effect of cathode area fraction on corrosion potential and corrosion rate is considered for a corroding surface controlled by activation polarization. It is shown that the corrosion potential and corrosion rate are most sensitive to area changes when the surface is largely cathode or anode. 5 ref. (R1a)

469-R.* Cathodic Protection of Radiant Heating Pipes. L. C. Wasson. *Corrosion,* v. 14, July 1958, p. 333t-336t.

(R10d; 4-60)

470-R.* Service Performance of Cast Magnesium Alloy Anodes. G. L. Christie. *Corrosion,* v. 14, July 1958, p. 337t-340t.

Designs tested included sand cast cylindrical anodes with cast-in steel conductor rods, which corroded in a very uniform pattern, and chill cast rectangular anodes with cast-in retaining straps, which corroded preferentially at the cast-in straps. The Mg alloy used in all cases was AZ-63. Chemical analysis of the metal indicates that the only major difference in the two anodes is inverse segregation of the major alloying constituents in the chill cast anodes. (R10d; Mg-b, 17-52)

471-R.* Corrosion of Steel in Water by Varied Ratios of Dissolved Gases. J. Wade Watkins and G. W. Kincheloe. *Corrosion,* v. 14, July 1958, p. 341t-344t.

Tests were conducted with varied ratios of free carbon dioxide to both oxygen and hydrogen sulphide. Corrosion rate as a function of time in the system was determined at time intervals to a maximum of 984 hr. exposure. Corrosion caused by oxygen and free carbon dioxide increased almost in direct proportion to the concentration of dissolved oxygen. 5 ref. (R4, 2-66; ST)

472-R.* Mechanism of Inhibiting Effect of Hydrofluoric Acid in Fuming Nitric Acid on Liquid-Phase Corrosion of Aluminum and Steel Alloys. David M. Mason and John B. Rittenhouse. *Corrosion,* v. 14, July 1958, p. 345t-350t.

Inhibiting effect of hydrofluoric acid is found to be dependent primarily on the formation of a tenacious insoluble fluoride compound of Al or Fe, respectively, on the surface of the metal. This mechanism is discussed in relation to solubility data for several pertinent compounds; analysis of passivating coating on metal samples; correlation of solubility data with extent of corrosion of metal. 5 ref. (R6g, R10b; Al-b)

473-R.* The Corrosion Resistant Properties of Zirconium. Pt. 2. F. G. Cox. *Corrosion Prevention and Control,* v. 5, June 1958, p. 46-48.

Summarizes resistance of Zr to liquid Bi, Bi-In-Sn eutectic, Bi-Pb eutectic, Bi-Pb-In eutectic, Ga, Li, Hg and Na. Galvanic corrosion and corrosion by gases. 8 ref. (R1a, R6m; Zr, *Bi, In, Pb, Ga, Hg, Na*)

474-R. Atmospheric Corrosion of Metals at Low Temperatures. A. A. Dychko and K. A. Dychko. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 261-267. (Translation by Consultants Bureau, Inc.)

A critical temperature of −25° has been found, below which atmospheric corrosion of metals is sharply retarded. The probability of chemical action on metal surfaces is decreased, because the absolute humidity of atmospheric air decreases with fall of temperature; moisture is deposited from the air in the form of hoarfrost and snow, which are less corrosive than water toward metals; rapid, relative moist corrosion passes into slow, relatively dry corrosion; atmospheric air has a lower content of the components which have an active influence on metal corrosion. 9 ref. (R3, 2-63)

475-R. (Japanese.) **Blackening of Stainless Steel.** R. Higashiumi. *Metals,* June 1958, p. 434-436.

The formation of black films by chromic acid oxidizing, electrochemical oxidizing, sulphidization and low-temperature oxidizing. (R1h; SS)

476-R.* Van de Graaff Study: Second Interim Report on the Deposition of Corrosion Products Under Irradiation. G. P. Simon, B. G. Schultz and Y. Solomon. *Bettis Technical Review,* WAPD-BT-7, Mar. 1958, p. 43-51.

Van de Graaff studies to determine what variables are involved in the phenomenon of preferential deposition of crud on fuel element surfaces. Previous work indicates that irradiation at freshly formed corrosion products causes a marked increase in the amount of deposition. Additional work indicates that the release rate and the amount of deposition vary inversely with pH. (R2b, 2-17)

477-R.* Watch Out for Stress Corrosion in Metals. E. H. Phelps. *Product Engineering,* v. 29, Aug. 4, 1958, p. 56-58.

Stress in certain chemical environments leads to intergranular and transgranular corrosion. Design principles to avoid this corrosion. (R1d; 3-66)

478-R.* (French.) **High-Temperature Corrosion by Water of Very Pure Aluminum Crystals.** Jean Herenguel and Pierre Lelong. *Comptes Rendus,* v. 246, Apr. 28, 1958, p. 3481-3484.

Variable grain growth in Al monocrystals proceeds according to crystal orientation and is associated with speed of corrosion and appearance of pits. A homogeneous, compact film is formed, followed by pitting. In some areas pits do not form; instead, depressions similar to surface undulations of Zr are noted. (R4a; 2-62, Al)

479-R.* (French.) **Research on Dry Corrosion. Oxidation of Lead Pellets.** Haidun N. Terem. *Faculte des Sciences de l'Universite d'Istanbul, Revue,* v. 22, Oct. 1957, p. 343-352.

Tiny pellets can be heated above melting point of lead without changing shape. Prior to heating, specimens were cleaned and sized with emery paper and others were further cleaned in solution of nitric acid. Oxidation of Pb at any temperature obeys parabolic law. Minimum of oxidation indicated by Gruhl in zone of crystallographic transformation of lead oxide is confirmed. An induction period is observed at 535° C., which partially confirms parabolic results obtained by Weber and Baldwin. Granting that oxidation develops at different speeds under 475 and over 530°, corresponding activation energies approach 6900 and 23,000 cal. 13 ref. (R1h; Pb, 6-67)

480-R.* (French.) **Corrosion of Iron in General and of Concrete Reinforcement in Particular.** M. Berthier. *Revue de Materiaux,* no. 511, Apr. 1958, p. 101-105.

Corrosion viewed as risk to be dealt with before occurrence; theory of passivation of iron; passivation techniques, use of low-solubility salts such as phosphates and fluorides. 3 ref. (R10c; Fe)

481-R.* (French.) **Study of the Corrosion Resistance of Nodular Cast Iron.** Irina Cornea. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 63-71.

Resistance to corrosion by hydrochloric acid of nodular cast iron is nearly twice as great as that of gray cast iron of similar composition and microstructure. This supports hypothesis that nodular cast iron in oxygen-free acid mediums should have better resistance than gray cast iron because of the smaller ratio of cathodic to anodic areas of nodular cast iron as compared with gray cast iron, the corrosion rate, in the presence of hydrogen depolarization, being determined by the ratio of cathodic to anodic areas. 4 ref. (R1, R6g; CI-r)

482-R.* (Russian.) **New Acid Resistant Nodular Iron.** Z. B. Shapiro. *Liteinoe Proizvodstvo,* no. 5, May 1958, p. 24-26.

Development of corrosion resistant iron with 3% C, 3% Si, 1% Mn, 2.2% Cr, 17.5% Ni and 8.5% Cu for use in automobile motor cylinder block. (R6g, T21b; CI-r)

483-R. Cavitation Resistance of Electrodeposited Chromium. M. G. Timerbulatov and V. E. Khromov. *Vestnik Mashinostroeniya,* v. 38, no. 2, 1958, p. 56-58. (Henry Brutcher, Altadena, Calif., Translation no. 4212.)

Index of cavitation resistance is loss of weight of specimens exposed to vibration with a magnetostrictional vibrator in a liquid. Setup for plating the specimens, correlation between cavitation resistance and Vickers hardness of Cr plates. Factors involved in cavitation resistance such as type of plate (dull vs. bright); thickness, porosity, brittleness and residual stress state of plate; hardness of basis metal. Cavitation resistance is improved by Cr deposits. (R2m, Q29c; *Cr,* 8-62)

484-R.* Action of Alternating Current on Corrosion Process of Iron. Yutaka Torigoe. *Electrochemical Society of Japan, Journal,* v. 28, 1958, p. E-30-E-33.

The effect of alternating current on the local cells on iron in a given corrosive environment is determined by the impressed potential, the polarization characteristics of the local anode and cathode and the magnitude of alternating current applied. (R1j; Fe)

485-R. Corrosion and Water Treatment. G. G. Sindery. *Corrosion Technology,* v. 5, July 1958, p. 209-212, 224.

Water treated for a specific industrial use may or may not be satisfactory from a corrosion standpoint. If not, it must be treated appropriately. (R4a, R10b)

486-R. The Formation of Crystalline Anodic Oxide Films on Beryllium. M. L. Levin. *Faraday Society, Transactions,* v. 54, June 1958, p. 935-940.

In 1 and 10% aqueous solutions of nitric acid and in a nitric + chromic acid solution the anodic films on electropolished polycrystalline Be are found to be always crystalline. In ammoniacal ethylene glycol, a nonaqueous electrolyte, the anodic film is amorphous. 15 ref. (R1h; Be)

487-R. (English.) **Passivity Induced by Chemical Surface Treatment.** K. S. Rajagopalan and K. S. G. Doss. *Naturwissenschaften,* Dec. 1958, p. 631.

(R10c)

488-R.* (French.) **Alloy Steels Resistant to Stress Corrosion in Presence of Hydrogen Sulphide.** P. Bastien. H. Veron and C. Roques. *Revue de Métallurgie,* v. 55, Apr. 1958, p. 301-317.

Study of Cr-Mo-V steels. Tests revealed that hydrogen embrittlement decreases in proportion to decreasing elastic limit, while interval before rupture increases; cold working has favorable effect, as does high Cr content. Heat treatment was developed for piping made of this type of alloy for use at natural gas installation where hydrogen sulphide is problem. 10 ref. (R1d, R7k, Q26s; SS, *Cr, Mo, V*)

489-R. (French.) **Electrochemical Study of the Corrosion of Stainless Steels.** J. M. Defranoux. *Societe Francaise des Electriciens, Bulletin,* v. 8, Mar. 1958, p. 174-181.

7 ref. (R11m; SS)

490-R. (German.) **Passivity of Metals.** H. Gerischer. *Angewandte Chemie,* May 21, 1958, p. 285-298.

86 ref. (R1a)

491-R. (German.) **Problems of Materials and Corrosion in Reactors With Liquid Metal Cooling Media.** Willibald Machu. *Atomkernenergie,* Mar. 1958, p. 97-100.

(R6m, T11p)

492-R. (German.) **Alternate Immersion Tests in Cast Iron and Steel Plates With Reference to Corrosion in Day-Shafts.** Werner Sardemann. *Glueckauf,* Mar. 1, 1958, p. 338-345.

(R11g; CI, ST, 4-53)

493-R. (German.) **Corrosive Action of Synthetic Materials on Metals.** E. P. Weissler. *Kunststoffe,* May 1958, p. 213-216.

(R7p)

494-R. (German.) **Corrosion of Metallic Material and Metallic Coatings in Industrial Atmospheres.** Gerhard Schikorr. *Schweizer Archiv,* Feb. 1958, p. 33-46.

78 ref. (R3n)

495-R. (German.) **Corrosion Protection Through "Passivation".** Hans Hebberling. *VDI-Zeitschrift,* v. 100, May 1, 1958, p. 565-566.

(R10c)

496-R.* (German.) **Corrosion Behavior of Magnesium During Inhibition and Activation of Its Dissolution Represented in a Corrosion-Current pH Diagram.** T. Markovic and L. G. Rubinic. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 357-359.

Conversion of the corrosion current into the conventional unit g. per sq. m. per day was carried out for an Mg electrode of 25 sq. cm. geometrical surface. Behavior of Mg after addition of activators and passivators showed that KF both accelerates and retards corrosion, depending on pH of the acid. 15 ref. (R10b, R10c; Mg)

497-R. (German.) **Cathodic Protection of Ship Hulls.** R. Juchniewicz. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 360-368.

Exhaustive suvey of sea water corrosion at Technological University, Gdansk. 36 ref. (R4b, R10d, T22g)

489-R. (German.) **Behavior of Cast Iron in Acids With and Without Inhibitors.** Willibald Machu and M. G. Fouad. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 369-379.

In acids and their mixtures, effect of inhibitors is independent of the nature of their charge. Losses of weight caused by mixtures are not equal to the algebraic mean of those of the individual acids, owing to modification of hydrogen ions and anions. Organic and inorganic inhibitors behave alike. Phosphate ions of phosphoric acid act as inhibitors. Carbides and silicides in the surface of the cast iron reduce inhibition. Structure of inhibitor film as well as solubility and resistance of surface film determine degree of inhibition. 7 ref. (R6g, R7b, R10b; CI)

499-R. (German.) **Cathodic Polarization of Active Chromium and Chromium-Iron Alloy in Sulphuric Acid.** Th. Heumann and B. Röschenbleck. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 383-390.

Cathodic polarization curves and rest potentials were measured with respect to pH of the electrolyte. Behavior of rest potential deviates from that of the hydrogen electrode. In the range of pH values investigated, cathodic polarization curves of the deposition of hydrogen are parallel. Exchange currents rise with increasing acid concentration and increasing Cr in the alloy. 15 ref. (R1a, R6g; Fe, Cr)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

500-R. (German.) Current Density and pH-Dependence of Electrochemical Structure and Decomposition of Layers of Oxide on Pt, Pd, and Au. K. J. Vetter and D. Berndt. *Zeitschrift für Elektrochemie*, v. 62, no. 3, 1958, p. 378-386.

17 ref. (R1h; Au, Pd, Pt)

501-R. (German.) Investigation of Kinetics of Scaling of Titanium in Water Vapor Using a New Volumetric Method. K. Loehberg and H. W. Schleicher. *Zeitschrift für Physikalische Chemie*, v. 15, Apr. 1958, p. 223-224.

19 ref. (R3, R11q; Ti)

502-R. (Japanese.) Study of Corrosion Due to Industrial Water. N. Awa and Y. Yamamoto. *Research Institute of Technology, Nihon University, Journal*, v. 16, Dec. 1957, p. 272-276.

An iron plate immersed in industrial water corrodes very rapidly, this corrosion rate being approximately twice that of distilled water, well water or city water. Corrosion prevention methods are cathodic protection and addition of an inhibitor. (R10b, R10d, R4; Fe)

503-R. (Japanese.) Effectiveness of Soap Additives and Cathode Protection Methods in Corrosion Prevention by Industrial Water. N. Awa and Y. Yamamoto. *Research Institute of Technology, Nihon University, Journal*, v. 16, Dec. 1957, p. 278-280.

An iron plate immersed in industrial water may be protected against corrosion merely by connecting a circuit with a Zn plate, or by adding soapy water of 0.1 to 0.2% concentration. The anticorrosion effect will not be reduced when soapy solution is dried into soap films. (R10b, R10d, R4; Fe)

504-R.* What You Can Do to Reduce Stress Corrosion. Fred J. Poss. *Chemical Engineering*, v. 65, July 28, 1958, p. 140-144.

Follow established good design practices in fabricating and assembling high-temperature equipment; avoid dead ends and traps where liquid can stagnate; avoid rough handling since this sets up stresses; avoid chlorinated solvents for cleaning equipment; slowly heat or cool equipment to minimize stresses; keep all high-temperature lagging absolutely dry. (R1d)

505-R.* Corrosion—Refesher on Cause and Cure. Robert V. Jelinek. *Chemical Engineering*, v. 65, July 28, 1958, p. 114-115.

Mechanism of corrosion; types of corrosion encountered; economic loss due to corrosion. (R-general)

506-R. Corrosion Resitance of Adhesive Bonded Aluminum Panels. F. J. Riel, S. E. Susman and Beverly Stewart. *American Chemical Society, Preprint* 19, Apr. 1958, p. 125-130.

(R11j; Al-b, 7-58)

507-R.* Corrosion of Aluminum Die Castings. D. L. Colwell and R. J. Kissling. *American Foundrymen's Society, Transactions*, v. 65, May 1957, p. 140-145.

Silicon alloys such as S5C and S12A have superior corrosion resistance and the Si-Mg alloy SG100A has inferior corrosion resistance. The common die-casting alloy SC84A has intermediate corrosion resistance. Iron beyond the 1.3% maximum now permitted for the cold chamber machine should be avoided for the best corrosion resistance. Zinc up to 2 or 2½% has no harmful effect on corrosion resistance. 7 ref. (R6g, Al-b, 5-61)

508-R. Protective Potentials of Metals. V. V. Gerasimov. *Bulletin of the Academy of Sciences of the USSR*, v. 3, 1957, p. 279-284.

A new method for calculating protective potentials is based on an exponential relationship between the rate of the anodic process of dissolution of metal and the potentials. 9 ref. (R10d)

509-R. Role of Hydrogenation in Corrosion Fatigue of Steel. G. V. Karpenko. *Academy of Sciences of the USSR, Proceedings*, v. 113, 1957, p. 219-221. (Translation by Consultans Bureau, Inc.)

4 ref. (R1e; ST, *H*)

510-R. (English.) Behavior of Structural Steel Subjected to Corrosion Fatigue. Shunzo Okamoto and Hideo Kitagawa. *Seventh Japan National Congress for Applied Mechanics, Proceedings*, 1957, p. 27-30.

(R1e; ST, SGB-s)

511-R. (Czech.) Study of Zinc Passivation With Tertiary Butanol Chromate in the Gas Phase. L. Cerveny, J. Nemcova and A. Hrbek. *Korose a Ochrana Materialu*, v. 2, no. 1-2, 1958, p. 1-6.

14 ref. (R10c, R7g; Zn)

512-R. (Czech.) Corrosion Resistance of Metals and Surface Treatment During Overseas Transport and in Tropics. K. Barton. *Korose a Ochrana Materialu*, v. 2, no. 1-2, 1958, p. 617.

(R3s, R4b)

513-R. (German.) Protection Against Corrosion in Cooling Water Circulation of Cars. Erich Caspers. *Eisenbahningenieur*, May 1958, p. 141-153.

(R10b, R4a)

514-R. (German.) Low-Temperature Corrosion in Oil-Fired Boilers. Maximilian Lang. *Energie*, v. 10, June 1958, p. 227-230.

(R4c, 2-63)

515-R. (German.) Corrosion Protection of Gas Pipes in Vienna, Austria. Franz Egerer. *Gas-Wasser-Wärme*, v. 12, May 1958, p. 93-97.

(R1a, R10d, T26r)

516-R. (German.) Application of Cathodic Corrosion Protection. Otto Bess. *Siemens-Zeitschrift*, v. 32, May 1958, p. 328-330.

(R10d)

517-R. (Japanese.) Acid Resistance of Iron-Silicon Alloys. J. Tashima. *Metals*, v. 28, June 1958, p. 437-440.

Relation of composition to acid resistance and mechanical properties. (R6g, 2-60; Fe, Si)

518-R. (Russian.) Cavitation of Condensate Pump Wheels and How to Overcome It. S. M. Tarashchaskii. *Vestnik Mashinostroeniya*, v. 38, June 1958, p. 25-26.

(R2m, W13d)

519-R. (Russian.) Corrosion Resistance of Aluminum and Aluminum Welds. M. N. Vitkovski and V. A. Maslov. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 429-430.

Use of solution of 10% nitric acid and 7 g. per l. sodium fluoride will greatly retard corrosion in 98% boiling nitric acid.
(R6g, R10b; Al-b, 7-51)

520-R.* Underground Corrosion. Pt. 1. Corrosion Mechanism of Metals in Soil. *Corrosion Technology*, v. 5, Jan. 1958, p. 5-9.

Bureau of Standards report on corrosion mechanism of metals in soil free of stray currents. Graphitization may decrease or accelerate the normal rate of corrosion; physical or chemical properties of the soil control the character of corrosion; pitting factors are roughly proportional to the ratio of the uncorroded areas. In well-aerated soils the rate of pitting, although initially great, falls off rapidly with time, whereas, in poorly-aerated soils, the initial rate scarcely falls off with time. Low-alloy steels have a greater pitting rate than the plain steel; however, as the exposure increases, the rate of pitting of the alloy steels diminishes more rapidly than the plain steel. High-alloy steels, especially Cr and Ni, decrease the weight loss through the entire range. (R8)

521-R.* Corrosion of Iron in Hydrochloric Acid in the Presence of Inhibitors at Various Temperatures. Pt. 1. I. P. Anoshchenko. *Journal of Applied Chemistry of the USSR*, v. 30, Mar. 1957, p. 417-422.

Polarization curve method used to study effects of potassium bromide, urotropine, acridine and combinations of them, on electrode processes in the corrosion of iron in 6 N hydrochloric acid solution at various temperatures (20, 40, 60 and 80°). At elevated temperatures urotropine has a considerably stronger retarding effect on the cathodic reaction of solution of iron in the acid. (R6g, R10b; Fe)

522-R.* Corrosion of Iron in Hydrochloric Acid in the Presence of Inhibitors at Various Temperatures. Pt. 2. I. P. Anoshchenko. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 557-561.

Depolarization in pure 6 N hydrochloric acid solution at 20° is effected by more than 95% by discharge of hydrogen ions. The solution rate of iron in pure acid rises with the temperature in geometrical progression. Participation of oxygen in depolarization increases with increasing inhibiting action of additives has been confirmed. The greatest inhibiting effect at 80° is produced by a combination of urotropine, ecridine, potassium bromide and methyl alcohol. The corrosion rate of iron in acid increases exponentially with the reciprocal of the temperature. (R6g, R10b; Fe)

523-R.* What to Do About Corroding Isomerization Units. J. F. Mason, Jr., and C. M. Schillmoller. *Petroleum Refiner*, v. 37, July 1958, p. 103-106.

Under conditions of severe corrosion by HCl in refineries, either pure Ni or a Ni-Cr alloy offers best resistance, particularly if installed by inert gas welding. (R6g; Ni-b)

524-R.* (German.) Electrochemical Method for the Study of Corrosion. M. Pourbaix. *Schweisstechnik*, v. 12, June 1958, p. 71-83.

Thermodynamics of corrosion of metals and alloys in aqueous solutions as well as in contact with moist substances. 9 ref.
(R4, R1, R11m)

525-R. Oxidation of Copper in Aqueous Potassium Dichromate-Sulphuric Acid Solutions. N. N. Milyutin and A. I. Shultin. *Journal of Applied Chemistry of the USSR*, v. 30, Mar. 1957, p. 367-372. (Translation by Consultants Bureau, Inc.)

(R1h; Cu)

526-R. Titanium Does a Fast Burn. *Chemical and Engineering News*, v. 36, Aug. 4, 1958, p. 36-37.

Titanium can oxidize very rapidly provided a fresh metal surface is formed to initiate the reaction.
(R1h; Ti-a)

527-R. (German.) **Significance of Flade-Potential in the Passivity of Iron in Alkaline Solutions.** K. E. Heusler, K. G. Weil and K. F. Bonhoeffer. *Zeitschrift für Physikalische Chemie,* v. 15, Apr. 1958, p. 149-161.

36 ref. (R6j, R10c; Fe)

528-R. Steel Company Opens Corrosion Research Lab. *Industrial Laboratories,* Aug. 1958, p. 8-11.

Carpenter Steel Co., Reading, Pa. (R-general; ST)

8 Inspection and Control

454-S.* **New Foundry Testing Methods.** Carol A. Koerner. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 181-187.

Cobalt radiography as a tool for improving gating and as a quality control check. Sonic tester developed to separate good and bad castings by measuring the frequency vibration. Hard and soft castings sorted electronically. (S13, S18, E-general)

455-S.* (Japanese.) **Quantitative Spectro-Analysis of Solution Method. Pt. 2. Quantitative Analysis of Cr, Fe and Si in Al-Cr Alloys.** Ushioda Toyoji, Yoshimura Osamu and Sada Masahiro. *Light Metals,* no. 30, May 1958, p. 34-37.

New method with carbon electrode which is not affected by its porosity and can be used in practical work. Analytical accuracy for Cr and Fe is satisfactory, but not for Si. (S11k; Al, *Cr, Fe, Si*)

456-S.* **Radioisotopes and Their Uses in Metallurgy.** F. Scot. *Metal Treatment and Drop Forging,* v. 25, June 1958, p. 227-232.

Applications in thickness measurement, analysis, flaw detection and tracer techniques. 16 ref. (S-general, 1-59; 14-63)

457-S. Radiographic Standards for Bronze Castings. Bureau of Ships. *U. S. Office of Technical Services,* PB 131854, July 1958. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $25.

Set of standard X-ray radiographic film copies for use in the evaluation of discontinuities which provide bases for comparison with radiographs from actual castings. They represent sections of gunmetal bronze plates (specification MIL-M-16576) cast ¾ in. thick. Discontinuities illustrated are gas porosity, shrinkage, sand inclusions, chaplets and tears. (S13e, S2z; Cu-s, 5-60)

458-S.* (Italian.) **Inspection of Anodic Coatings on Aluminum.** A. Prati. *Alluminio,* v. 27, Apr. 1958, p. 165-172.

Methods and equipment for determining thickness, porosity, resistance to corrosion, light and abrasion, dielectric rigidity and electrical resistance of coatings. 18 ref. (S13, S14, P15, R-general; Al, 8-73)

459-S.* **Determination of Boron in Carbon and Low-Alloy Steels.** *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 227-232.

Method based on the removal of metal ions from a solution of the sample by a cation-exchange resin and subsequent absorptiometric determination of boron in the eluate by means of dianthrimide. The method gives a high degree of reproducibility and sensitivity. 8 ref. (S11f; CN-g, AY-b, B)

460-S.* (German.) **Zirconium-Magnesium Alloys.** G. N. Cherry, *Giessserei-Praxis,* v. 76, Apr. 25, 1958, p. 147-149.

Composition, heat treatment, mechanical and physical properties of English standards Elektron RZ5 and Z5Z for sand, and Elektron ZRE1 for sand and injection molding. Purpose of flux is to float out impurities and protect molten metal from oxidation. For casting, temperature from 700 to 780° is suggested. Iron and steel crucibles lined with fire-resistant material and careful cleaning and regular checking advised. Melting and refining process. 11 ref. (S22, E-general; Mg, Zr)

461-S.* **The Determination of Tungsten in Titanium, Zirconium and Their Alloys.** D. F. Wood and R. T. Clark. *Analyst,* v. 83, June 1958, p. 326-334.

To fulfill the need for satisfactory methods for the determination of W over the range 0.002 to about 1% in Ti and its alloys, two absorptiometric procedures have been developed, and subsequently extended to the examination of Zr and its alloys. 7 ref. (S11a; Ti-b, Zr-b, W-a)

462-S.* **Analysis of Bismuth Base Alloys. Pt. 3. Ternary Alloys Containing Uranium and Neodymium or Praseodymium.** G. W. C. Milner and J. W. Edwards. *Analytica Chimica Acta,* v. 18, June 1958, p. 513-519.

Procedures for the analysis of Bi-base alloys containing 0.2-5% U and 0.2-5% Nd or Pr. 16 ref. (S11j, Bi-a, U-a, Nd, Pr)

463-S.* **The Polarographic Determination of Indium in Zinc-Base Alloys. Pt. 2. The Determination of Indium in Zinc and in Zinc Alloys of Low Aluminum Content.** G. F. Reynolds and H. I. Shalgosky. *Analytica Chimica Acta,* v. 18, June 1958, p. 607-611.

Studies of the application of an 8-hydroxyquinoline extraction and of a zinc oxide "collection" procedure for the separation of trace amounts of In from Zn alloys. 8 ref. (S11m; Zn-b, In)

464-S.* **Polarographic Determination of Indium in Zinc-Base Alloys. Pt. 3. The Determination of Indium in Zinc and in "Lead-Free" Zinc Alloys.** G. F. Reynolds and H. I. Shalgosky. *Analytica Chimica Acta,* v. 18, June 1958, p. 612-615.

A method for the polarographic determination of In in Zn alloys, applicable when the Pb concentration is small compared with that of In. 7 ref. (S11m; Zn-b, In)

465-S.* **The Polarographic Determination of Aluminum. Pt. 1. General Introduction. Polarography of Solochrome Violet R. S. in the Presence of Aluminum.** M. Perkins and G. F. Reynolds. *Analytica Chimica Acta,* v. 18, June 1958, p. 616-624.

The polarography of Al; study of method involving the modification by this element of the polarographic characteristics of a diortho-hydroxy azo dye. Interferences from other elements discussed; means for their removal. 36 ref. (S11m; Al-a)

466-S.* **The Polarographic Determination of Aluminum. Pt. 2. The Determination of Microgram Amounts of Aluminum in Beryllium Metal.** M. Perkins and G. F. Reynolds. *Analytica Chimica Acta,* v. 18, June 1958, p. 625-631.

The method involves the removal of Al from the bulk of the Be and from certain other elements by extraction with 8-hydroxyquinoline into chloroform. 11 ref. (S11m; Al-a, Be-a)

467-S.* **The Polarographic Determination of Copper and Iron and Its Application in the Hydrometallurgy of Copper.** R. J. Cathro and A. Walkley. *Australian Journal of Applied Science,* v. 9, June 1958, p. 105-114.

The results agree well with those determined by conventional volumetric and gravimetric procedures but the polarographic methods have the advantage of speed and directness. 10 ref. (S11m; Cu, Fe)

468-S. Analysis Control of Tin Bronze and Gun Metals. Jorma Kinnunen and Bertil Wennerstrand. *Foundry,* v. 86, July 1958, p. 97.

Outlines ethylenediaminetetraacetate (EDTA) titration method for determination of tin. 7 ref. (S11j; Cu-s, Sn)

469-S. Weld Radiography. *Industry and Welding,* v. 31, Mar. 1958, p. 28-45.

Explains radiography and its use in the shop and field for inspection and quality control of welds. Recommended equipment and setting for stationary and portable machines; films for various materials. (S13e, 7-51)

470-S.* **Assessment of an Electronic Image-Intensifier for Weld Radiography.** R. Halmshaw and C. Hunt. *Welding and Metal Fabrication,* v. 26, July 1958, p. 249-254.

Performance and potential range of application of a Philips image-intensifier tube. Techniques; attainable sensitivities. Comparisons of performance with radiography on film and with enlarged-image fluoroscopy are made with reference to the examination of welds. 9 ref. (S13e, T1j; 7-51)

471-S.* **Two Apparatus for the Determination of Gases in Metals.** D. L. Guernsey and R. H. Franklin. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 3-14.

Discusses vacuum fusion technique and a specialized apparatus for determination of hydrogen in steel. Apparatus includes a furnace for hot extraction of hydrogen, heated either by induction or by resistance (7), as well as the original induction heated tin fusion furnace. 16 ref. (S11r)

472-S.* **The Application of Vacuum Fusion to Gas-Metal Studies.** A. L. Beach and W. G. Guldner. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 15-24.

Extension of the vacuum fusion method to the study of Ge, Si, Ta and Mo. Fusion baths have been used to alloy samples. Data on an Fe bath, an Ni bath and a Pt-Fe bath. (S11r)

473-S.* **Oxygen Determination Using a Platinum Bath and Capillary Trap.** William G. Smiley. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 25-32.

As in vacuum fusion, the sample is fused in a graphite crucible with a flux, but a stream of argon at atmospheric pressure is used in place of high vacuum. Platinum is not an effective flux for the refractory metals such as Ta and W; Pt-Co and Pt-Fe alloys dissolve these metals but give somewhat low results on known samples. The Pt bath

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

gave a standard deviation of 7 ppm. on 50-mg. Pu samples. Twenty-two elements and numerous alloys have been analyzed. 10 ref. (S11r; O)

474-S.* Bromination-Carbon Reduction Method for the Determination of Oxygen in Metals. Maurice Codell, George Norwitz and Silve Kallmann. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 33-40.

Optimum temperature for the bromination reaction is approximately 900° C. At temperatures considerably less or greater, the reaction is slower. The use of bromine free from organic compounds is desirable. Graphite, platinum or gold boats may be used. The method has been applied to the determination of oxygen in Ti, Zr, Cr, V, steels and other metals. It is not applicable to steel containing oxide inclusions. 5 ref. (S11j; O)

475-S.* Emission Spectrometric Determination of Oxygen in Metals. Velmer A. Fassel, William A. Gordon and Ray W. Tabeling. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 41-60.

Methods for the determination of oxygen in steel, titanium, the rare earths and other metals. Procedures are based on the liberation of the oxygen content of the metal into an argon atmosphere. Procedures described determine oxygen with a precision comparable to vacuum fusion or bromination—carbon reduction techniques and have the advantage of greatly reduced time requirements. 38 ref. (S11k; O)

476-S.* Temperature Measurement in Solids. W. H. Giedt. *Product Engineering*, v. 29, July 21, 1958, p. 65-67.

Description of thermistors, resistance elements and thermocouples, including temperature range, output error, cost and size. (S16b, X9)

477-S.* Separation of Niobium and Tantalum With Cupferron. A. K. Majumdar and J. B. Ray Chowdhury. *Analytica Chimica Acta*, v. 19, July 1958, p. 18-22.

Method gives highly satisfactory results when applied to the analysis of Cb in Cb-Mo stainless steel. (S11j; SS, *Cb, Ta*)

478-S.* Activation Analysis of Vanadium in High Alloy Steels Using Manganese as Internal Standard. G. Leliaert, J. Hoste and J. Eeckhaut. *Analytica Chimica Acta*, v. 19, July 1958, p. 100-107.

Method for the determination of V in high-alloy steels by radioactivation analysis. Manganese present in the steel sample is used as an internal standard, thus permitting accurate correction of neutron flux irregularities between sample and reference. (S11q; SS, *V*)

479-S.* Determination of Carbon in Titanium, Zirconium and Their Alloys by Gravimetric and Conductimetric Methods. D. F. Wood and M. Williams. *Metallurgia*, v. 58, July 1958, p. 47-52.

Carbon in Ti and Zr can be satisfactorily determined by a combustion method involving the use of argon to moderate the otherwise vigorous oxidation reaction, provided that suitable fluxes are mixed with the sample. 8 ref. (S11b, S11g; *C*, Ti, Zr)

480-S.* Investigations on Colorimetric Methods of Metallurgical Analysis. Pt. 6. Estimation of Silicon in Cast Iron Using the Duboscq Type of Colorimeter. G. V. L. N. Murty. *Metallurgia*, v. 58, July 1958, p. 52-54.

A simple procedure for the estimation of Si in pig iron which compares very favorably with the standard gravimetric methods, reduces time of analysis to 15 min. 10 ref. (S11a, *Si*, CI)

481-S.* Measuring Scratches Accurately Reduces Rejects. Bobly Siebel and Fred R. Miller. *Tool Engineer*, v. 41, Aug. 1958, p. 55-57.

Optical shadow projection instrument measures depth of scratches accurately to 0.00005 in. Instrument is portable, easily used. (S13d, S15d, 1-53)

482-S. Delayed Back-Up Roll Failure in Cold Rolling Mills. M. M. Krobin and K. V. Shishokina. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 43-48.

Factors which lead to sleeve failure. Since sleeves do not fail suddenly after having been shrunk onto shafts it was possible to observe the effect of continued static stresses. Based on observation that highly plastic, improved steel showed no tendency toward delayed failure, it is desirable to develop such heat treatment that would leave the sleeve with an extremely hard rolling surface and a soft center. Evidently surface hardening is indicated. 7 ref. (S21, Q-general)

483-S. (English.) Activation Analysis of Manganese in Ferromanganese Alloy Using Radium-Beryllium Neutron Source. Yuzuru Kusaka. *Chemical Society of Japan, Bulletin*, v. 31, Mar. 1958, p. 216-219.

(S11g; Mn, Fe, AD-n)

484-S. (German.) Methods of Evaluation and Errors in Quantitative Optical Spectral Analysis. Hans Diebel. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 275-281.

Comparison between spectrographic and spectrometric methods of analysis showed that optical methods, because of different way of registering line intensity, render more accurate results, particularly for the light alloys. Influence of fluid components upon evaporation and optical diffraction, influence of errors in the optic system and in the electronic system as well as equipment for speeding up the evaluation process. 7 ref. (S11k)

485-S. (German.) Photometric Determination of Titanium in Steel by Chromotrope, Gallic and Pyrogallolcarbonic Acid. L. Sommer. *Collection of Czechoslovak Chemical Communications*, v. 22, Dec. 1957, p. 1793-1798.

18 ref. (S11a; ST, *Ti*)

486-S. (German.) Photocolorimetric Determination of Zirconium by Means of Morin. H. Tuma and N. Tietz. *Collection of Czechoslovak Chemical Communications*, v. 23, Jan. 1958, p. 142-146.

7 ref. (S11a; Zr)

487-S. (German.) Polarographic Determination of Impurities in Pure Indium. Franz A. Pohl and Willy Bonsels. *Fresenius' Zeitschrift für Analytische Chemie*, v. 161, Apr. 1958, p. 109-114.

6 ref. (S11m, 9-51; In-a)

488-S. (German.) Picolinic Acid and Quinaldinic Acid in the Separation and Volumetric Determination of Palladium. A. K. Majumdar and J. G. Sen Gupta. *Fresenius' Zeitschrift für Analytische Chemie*, v. 161, Apr. 1958, p. 180-181.

(S11j; Pd)

489-S. (German.) Picolinic Acid and Quinaldinic Acid in the Separation and Complexemetric Determination of Palladium. A. K. Majumdar and J. G. Sen Gupta. *Fresenius' Zeitschrift für Analytische Chemie*, v. 161, Apr. 1958, p. 181-183.

14 ref. (S11j; Pd)

490-S. (German.) Present Status of Sheet Metal Testing by Ultrasonics. W. Lehfeldt. *Industrie-Anzeiger*, Apr. 25, 1958, p. 481-486.

12 ref. (S13g; 4-53)

491-S. (German.) Contribution to the Determination of Rhodium in Plating Baths. S. Dorner and M. Froels. *Metalloberfläche*, v. 12, June 1958, p. 168-169.

Control of the rhodium content of the baths. Various methods of analysis. 8 ref. (S11, L17c; Rh)

492-S. (German.) Oscillograph Method for Testing Aluminum Oxide Layers. G. Hahn. *Metalloberfläche*, v. 12, June 1958, p. 170.

With the aid of the oscillograph and without any additional voltage it is possible to detect faults in the anodically produced oxide layer on Al. The method also permits a better determination of properties of the oxide skin than possible with other electrical methods. 7 ref. (S13c, Q29; Al-b, 8-73)

493-S. (German.) Evaluation of Iron Ores. Willy Zimmer. *Neue Hütte*, v. 3, Apr. 1958, p. 233-235.

Fe content does not determine exclusively the value of iron ore, and slagforming components are of great importance too. Formula for evaluation of iron ores gives results taking into account the usual components in the ore. (S11; Fe, RM-h)

494-S. (German.) Nondestructive Testing of Materials by Radio-Isotopes. E. Schiebold and E. Baker. *Technik*, no. 5, 1958, p. 337-343.

9 ref. (S11e)

495-S. (German.) Ultrasonic Inspection. H. Staeger. *Technische Mitteilungen*, Nov. 1957, p. 414-423.

17 ref. (S13g)

496-S. (German.) Tentative Standard Specification for Nodular Cast Iron. *VDI-Berichte*, v. 27, 1958, p. 11.

(S22; CI-r)

497-S. (Italian.) Photometric Determination of Iron in Very Pure Aluminum (Raffinal) and Aluminum Alloys. G. Matelli and E. Attini. *Alluminio*, v. 27, Mar. 1958, p. 119-121.

14 ref. (S11a; Al, *Fe*)

498-S. (Japanese.) Determination of Nitrogen in Metals by Combustion. Masahiko Tsuchiya. *Japan Analyst*, v. 7, Jan. 1958, p. 12-16.

In cases where a complete decomposition of the sample by oxidation is possible, all the nitrides can be determined by the combustion method. The determination is verified by mass spectrometry with satisfactory results except in the case of chromium nitride. (S11b; N)

499-S. (Japanese.) Determination of Nitrogen and Carbon in Ferro-Alloys. Masahiko Tsuchiya. *Japan Analyst*, v. 7, Jan. 1958, p. 17-21.

Determination of nitrogen investigated by changing the conditions of combustion. Quantitative determination of nitrogen in easily combustible samples by using lead oxide. Ferrochrome gives satisfactory results by this method. (S11j; C, N, *Fe*, AD-n)

500-S. (Japanese.) Rapid Polarographic Determination of Manganese in Ferromanganese and Manganese Slag.

T. Dono, K. Morinag, T. Nomura and G. Nakagawa. *Japan Analyst,* v. 7, Jan. 1958, p. 25-28.

The pH values, maximum suppressive agents, interfering ions, etc., investigated in the quantitative determination of Mn (III); it was found that Ni, Co, Cu, Zn, Pb in 0.3M pyrophosphate showed no disturbing effect and gave a definite polarographic wave.
(S11m; *Mn,* AD-n, Rm-q)

501-S. (Japanese.) **Rapid Photometric Microdetermination of Iron in Chromium, Manganese and Nickel by the Oxinate Extraction Method.** K. Motojima and H. Hashitani. *Japan Analyst,* v. 7, Jan. 1958, p. 28-33.

Ferric oxinate may be quantitatively extracted from fairly acidic solution (pH≥2.4) by chloroform, and the extract has two absorption maxima at 470 and 580 mu. Small amounts of iron in Cr, Mn and Ni may be determined rapidly and accurately. (S11a; *Fe*)

502-S. (Japanese.) **Determination of Zn in Iron Ores in the Presence of Co.** Yoshimi Umezaki.*Japan Analyst,* v. 7, Jan. 1958, p. 37-42.

The supernant solution produces a well-developed zinc spectral wave which is suitable for the determination. Method is most suitable for Zn in quantities less than 1%.
(S11K; *Zn,* Fe, RM-n)

503-S. (Japanese.) **Photometric Determination of Copper in Tin by the Ethylenediamine Tetra-Acetate Method.** S. Ikeda and H. Nagai. *Japan Analyst,* v. 7, Feb. 1958, p. 76-79.

(S11a; *Cu,* Sn)

504-S. (Japanese.) **Rapid Spectrophotometric Determination of Zirconium in Steel.** Shigeo Wakamatsu. *Japan Analyst,* v. 7, Feb. 1958, p. 84-89.

(S11a; ST, *Zr*)

505-S. New Techniques for Finding "Come and Go" Causes That Affect Quality. E. C. Zuppann. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 88-93.

Data analysis system using a ranking method to pinpoint variables affecting quality.
(S12, E-general)

506-S. Quality Control in a Small Foundry. Jules J. Henry. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 146-150.

Differences in quality control programs of large and small foundries; reasons for the need of quality control; methods of quality control that are more useful for small foundries. Specific examples where statistical quality control can be used in small foundries.
(S12, E-general)

507-S. Quality Control for the Foundry Foreman. Jules J. Henry. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 177-180.

Points out need for a quality control program and how the foreman shares the responsibility. Ways that supervision can use statistics to control quality; factors that must be controlled. Examples of specific uses of charts and graphs in foundries and how they can be of use to the foundry foreman.
(S12, E-general)

508-S. Determination of Very Small Amounts of Carbon in Metals. Robert E. Fryxell. *Analytical Chemistry,* v. 30, Feb. 1958, p. 273-275.

Controlling the combustion temperature with a variable transformer significantly improves precision of measurement (conductometric). 7 ref. (S11j; C)

509-S. Determination of Low Concentrations of Hafnium in Reactor-Grade Zirconium Metal and Zirconium Alloys by Neutron Activation. W. D. MacKintosh and R. E. Jervis. *Analytical Chemistry,* v. 30, July 1958, p. 1180-1182.

(S11q; *Hf,* Zr)

510-S. Colorimetric Determination of Molybdenum in the Presence of Tungsten. Dumas A. Otterson and Judson W. Graab. *Analytical Chemistry,* v. 30, July 1958, p. 1282-1284.

(S11a; Mo, W)

511-S. Enhanced Precision in the Quantometric Determination of Phosphorus in Low-Alloyed Steels. Niilo Lounamaa. *Applied Spectroscopy,* v. 12, no. 2, 1958, p. 53-54.

Phosphorus contents in the range from 0.01 to 0.07% in steels can be determined with a coefficient of 2 to 4%. (S11; ST, *P*)

512-S. Instrumentation for Iron and Steel. B. O. Smith. *Instrument Practice Automation and Electronics,* v. 12, June 1958, p. 644-649.

Furnace temperature and pressure control; strip width and thickness control; detection of laminations and pinholes.
(S13, S14, S16, S18; ST)

513-S. Pyrometry in the Non-Ferrous Foundry. Platinum Thermocouples in the Control of Melting Operations. *Platinum Metals Review,* v. 2, July 1958, p. 90-91.

(S16a, E-general, X9q, 1-52; EG-a38)

514-S. Radiography. William D. Kiehle. *Society for Nondestructive Testing, Journal,* v. 16, July-Aug. 1958, p. 313-318.

Materials, applications and typical examples of use of radiography.
(S13e)

515-S. Sources of Defects Located by Nondestructive Testing. C. E. Betz. *Society for Nondestructive Testing, Journal,* v. 16, July-Aug. 1958, p. 319-322.

Methods of detecting shrinkage porosity, shrink cracks, cupping, pipes, laminations, bursts, flaking, grinding cracks and fatigue cracks.
(S13)

516-S. Principles of High Energy Radiography. Stanley E. Stacey. *Society for Nondestructive Testing, Journal,* v. 16, July-Aug. 1958, p. 339-344.

Advantages of high-energy radiography in testing sections of varying thicknesses; reduction of scattered radiation; effect of different film speeds, density levels. (S13e)

517-S. Rapid Determination of Iron in Slag. Hermann-Josef. *Archiv für das Eisenhüttenwesen,* v. 27, Dec. 1956, p. 753-760. (Iron and Steel Institute Translation no. 739.)

Previously abstracted from original. See item 81-S, 1957.
(S11p; RM-q; Fe)

518-S. Comparison of Metal Control for Hairline Cracks in Billets and Finished Products. Z. M. Kalinina. *Stal',* v. 17, Mar. 1957, p. 261-263. (Iron and Steel Institute Translation no. 878.)

Previously abstracted from original. See item 490-S, 1957.
(S13, 1-10; ST, 4-2, 9-22)

519-S. Some New Apparatus for the Continuous Nondestructive Control of Metals. L. Beaujard and V. Husarek. *Metaux-Corrosion Industries,* v. 32, Dec. 1957, p. 459-468. (Iron and Steel Institute Translation no. 959.)

Previously abstracted from original. See item 202-S, 1958.
(S13h, S13g, 1-52)

520-S. The Testing of Materials and Workpieces for Acceptance. Rudolf Schinn. *Stahl und Eisen,* v. 77, Nov. 14, 1957, p. 1674-1686. (Iron and Steel Institute Translation no. 960.)

Previously abstracted from original. See item 63-S, 1958.
(S22, S13, ST)

521-S. (French.) **Ultrasonic Testing.** P. Bastien. *Soudage et Techniques Connexes,* v. 12, May-June, 1958, p. 187-188.

Survey of work undertaken in France; studies on reference blocks and the interpretation of the various types of weld defects, inquiry into testing equipment and methods, compilation of a trilingual collection of terms used in ultrasonic testing.
(S13g; 7-51)

522-S. (German.) **Determination of Oxide in Sintered Aluminum.** Friedrich Eisenkolb and Klaus Müller. *Chemische Technik,* Jan. 1958, p. 32-33.

9 ref. (S11, H10; Al, O, 6-70)

523-S. (German.) **Determination of Antimony in Copper Alloys.** Eberhard Mohr. *Chemische Technik,* Jan. 1958, p. 34-35.

6 ref. (S11; Cu-b, *Sb*)

524-S. (German.) **Application of Amino Compounds in the Polarography of Inorganic Substances; Determination of Cobalt in Steel and Ores.** J. Dolezal and J. Novak. *Collection of Czechoslovak Chemical Communications,* v. 23, May 1958, p. 866-871.

24 ref. (S11m; *Co,* ST, RM-n)

525-S. (German.) **Determination of Vanadium in Pure Aluminum.** L. Erdey and F. Szabadvary. *Fresenius' Zeitschrift für Analytische Chemie,* v. 159, Jan. 1958, p. 429-434.

6 ref. (S11a; Al-a, *V*)

526-S. (German.) **Present State of Standardization in the Aluminum Industry.** A. P. Liebe. *Industrie-Anzeiger,* v. 80, June 3, 1958, p. 647-649.

4 ref. (S22; Al, Mg)

527-S. (German.) **Rapid Photometric Determination of Chromium in Copper-Chromium Alloys.** Hugo Wiedmann. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 248-249.

Technique using electrophotometer. (S11a; Cu, *Cr*)

528-S. (Japanese.) **Application of Ultrasonics to the Metallurgical Industry.** Y. Hori. *Metals,* v. 28, June 1958, p. 452-456.

10 ref. (S13g)

529-S. (Russian.) **Study of Mineral Content of Krivoi Rog Ore Sinters.** E. F. Vegman. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 444-446.

Investigations by mineralography and radiography. 7 ref. (S11, RM-n)

530-S. (Russian.) **Determination of Zinc and Cadmium by Potentiometric Titration of Calcium Ferro-Cyanide.** P. K. Agasyan. *Zavodskaya Laboratoriya,* v. 24, May 1958, p. 532-534.

(S11j; Cd, Zn)

531-S. (Russian.) **Complexometric Determination of Copper.** O. B. Budevskii. *Zavodskaya Laboratoriya,* v. 24, May 1958, p. 535-537.

(S11j; Cu)

532-S. (Russian.) **Use of Radiography to Determine Mineral Deposits.** A. S. Ivoilov and D. T. Grebennikova. *Za-*

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

vodskaya Laboratoriya, v. 24, May 1958, p. 582-585.

4 ref. (S11p; RM-n)

533-S. Quantitative Determination of Rare Earths in Minerals and Concentrates by Fluorescent X-Ray Method. R. L. Barinskii. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 613-617.

(S11p; EG-g)

534-S. (Russian.) **Quantitative Fluorescent X-Ray Analysis of Ores and Minerals for U, Th, Pb, Ta, Hf, Nb, Zr, Y and Sr.** K. I. Narbutt and I. D. Bespalova. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 617-619.

(S11p; RM-n)

535-S. (Russian.) **Quantitative Determination of Zirconium in Ores by Fluorescent X-Ray Spectrum.** N. F. Losev and A. N. Glotova. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 619-621.

4 ref. (S11p; *Zr*, RM-n)

536-S. (Russian.) **Analysis of Pure Metals.** V. A. Kazarenko and G. V. Flyantikova. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 663-666.

Determination of admixture of silicon in certain semiconductor metals. 7 ref. (S11; *Si*, EG-j)

537-S. (Russian.) **Comparative Study of Photometric Determination of Gallium.** D. P. Shcherbov and A. I. Ivankova. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 667-674.

27 ref. (S11a; Ga)

538-S. (Russian.) **Determination of Titanium Micro Particles in Columbium.** Yu. A. Chernikhov, Sh. G. Melamed and B. M. Dobkina. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 677-679.

5 ref. (S11d; Cb, *Ti*)

539-S. (Russian.) **Spectral Analysis of Steel With Modernized Photometric Device FES-I.** N. V. Buyanov, S. L. Zubkovskii and T. V. Kovalenko. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 703-708.

(S11k, 1-53; ST)

540-S. (Russian.) **Analysis of Certain Alloy Elements With Aid of Photo-Electric Stylometer.** K. A. Sukhenko, K. A. Moiseeva and I. G. Tishin. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 711-712.

Use of stylometer has made possible determination of Al in Ni and Mg alloys as well as high concentration of Cu, Zn and Mg in Al alloys. (S11a; Al, Cu, Ni, Mg, Zn)

541-S. (Russian.) **Photo-Electric Spectral Analysis of Metals Abroad.** L. N. Filimonov and V. O. Khandros. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 712-723.

General review of developments in U. S. A., Britain, France, Italy and Japan. 39 ref. (S11k)

542-S. (Russian.) **Spectral Determination of Metallic Traces.** Sh. I. Peizulaev, A. G. Karabash, L. S. Krauz and F. A. Kostareva. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 723-731.

Chemico-spectral analysis of strontium, chromium and silicon. 14 ref. (S11k; Cr, Si, Sr)

543-S. (Russian.) **Spectral Analysis of Highly Pure Tin Preceded by Enrichment With Halogen Compounds.** D. M. Shwartz and V. V. Portnova. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 731-734.

7 ref. (S11k; Sn-a)

544-S. (Russian.) **Spectrochemical Determination of Admixtures in High-Purity Metallic Zinc.** R. I. Gutkina. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 734-736.

7 ref. (S11k; Zn-a)

545-S. (Russian.) **Spectral Analysis of Metals by Means of Evaporation.** L. V. Lipis. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 736-745.

General review of literature. Method, particularly effective for pure metals, and originally developed for testing heavy metals with complex spectrum, has been effectively applied to Al, Ca, Be, determination of admixtures in semiconductor metals. Method has sensitivity up to 10^{-6} to 10^{-7}%. 48 ref. (S11k; 11-65)

546-S. (Russian.) **Analysis of Ferrous and Nonferrous Alloys With Spectrograph ISP-51.** A. S. Dem'yanchuk, M. E. Shifman and M. I. Rekitar. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 751-752.

(S11k, 1-52)

547-S. (Russian.) **Photo-Electric Analyzer for Investigation of Aluminum Alloys.** L. S. Feld'man, G. A. Prokhorov and T. A. Bronnikova. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 776-778.

(S11a, 1-53; Al-b)

548-S. (Spanish.) **Determination of Beryllium.** Reinaldo Vanossi. *Asociacion Quimica Argentina*, v. 45, Dec. 1957, p. 215-226.

20 ref. (S11; Be)

549-S.* (German.) **Method of Testing Electroplated Steel Screws.** H. G. Bobe. *Draht*, v. 9, June 1958, p. 218-219.

Methods for determining coat thickness. Comparison of condensation and dip with drop method. Technique and application of the latter. (S14, T7f; 8-62)

550-S.* (German.) **Interpretation of Defects in Ultrasonic Testing.** H. Krainer and E. Krainer. *Schweisstechnik*, v. 12, Mar. 1958, p. 28-32.

Relationship between defect echo and bottom echo. Experiments on specimens with intentionally produced defects and evaluation of results. Influence of defect size, defect form, distance and orientation on the ratio defect echo/back wall echo. 7 ref. (S13g)

551-S.* (German.) **Electronic Microanalyzer With Sound; Its Application in Metallurgy.** Charles Crussard. *Schweisstechnik*, v. 12, Apr. 1958, p. 43-47.

Spot-analysis by radiospectrograph. Construction of apparatus; results of experiments in determination of Mn; determination of oxides during scale formation; study of phases; examination of iron ores. (S11)

552-S. Emission Spectrographic Determination of Metallic Impurities in Powdered Boron. Seymour Lader. *Applied Spectroscopy*, v. 12, 1958, p. 85-86.

7 ref. (S11k; B)

553-S. A Semi-Quantitative Universal Method of Spectrochemical Analysis. P. V. Mohan and D. L. Fry. *Applied Spectroscopy*, v. 12, 1958, p. 90-95.

Method of spectrochemical analysis designed for determination of all metallic elements in powder samples calibrated for 20 elements. The method uses lithium carbonate as a common matrix. 15 ref. (S11k)

554-S. Spectrographic Porous Cup Technique for the Analysis of Indium Alloys. Harry M. Hvman. *Applied Spectroscopy*, v. 12, 1958, p. 95-97.

3 ref. (S11k; In-b)

555-S. Determination of Impurities in Metallic Chromium. N. V. Ageev, A. I. Ponomarev, B. N. Melentyev and V. A. Trapeznikov. *Journal of Applied Chemistry of the USSR*, v. 30, Mar. 1957, p. 505-509.

Methods for the determination of silicon, iron, titanium, zirconium, aluminum, manganese, nickel, copper, hydrogen and nitrogen. 6 ref. (S11; Cr-b, *Si, Fe, Ti, Zr, Al, Mn, Ni, Cu*)

556-S. Spectrographic Determination of Oxygen in Titanium. R. E. Heffelfinger and W. M. Henry. Battelle Memorial Institute (Office of Assistant Secretary of Defense). *U. S. Office of Technical Services*, PB 121641, Apr. 1958, 24 p. $.75.

(S11k; O, Ti)

557-S. (Russian.) **Mechanization of Quality Control in Steel Production.** N. V. Samotesov. *Metallurg*, v. 3, June 1958, p. 32-34.

(S12, 18-74; ST)

558-S. (Book.) **Symposium on Determination of Gasses in Metals.** 60 p. 1957. American Society for Testing Materials, STP no. 222, 1916 Race St., Philadelphia 3, Pa.

Five papers presented at the 60th Annual Meeting of the ASTM, Atlantic City, N. J. June 18, 1957. Papers are abstracted separately. (S11r)

Metal Products and Parts

310-T.* Corrosion Behavior of Aluminum in the Construction Industry. J. F. Whiting and H. P. Godard. *Engineering Journal*, v. 41, June 1958, p. 45-54.

Influence of environmental factors on performance of Al alloys. 21 ref. (T26; Al-b)

311-T.* New Metals in the Oil Industry. Pt. 1. Titanium and Zirconium, Tantalum and Niobium. W. H. L. Hooper. *Petroleum*, v. 21, July 1958, p. 219-224.

Characteristics of Ti and Zr from viewpoint of petroleum equipment manufacturers.
(T29n; Ti-b, Zr-b, Ta, Cb)

312-T. The Re-Servicing of Carbide Tools. *Australasian Manufacturer*, v. 43, June 7, 1958, p. 44-45, 48, 50-51, 60-62, 65.

(T6n)

313-T.* Out-of-Pile Dynamic Loop Tests of Irradiated Fuel Materials. L. A. Waldman and W. T. Lindsay. *Bettis Technical Review*, WAPD-BT-7, Mar. 1958, p. 1-15.

An extended series of dynamic tests of clad and defected pre-irradiated specimens of U-Mo alloy and UO_2 fuel materials carried out in out-of-pile loops. The tests contrasted the major difference in the behavior of alloy and oxide fuel material during failure of fuel elements. Results demonstrated considerable stability of the UO_2 specimens and showed that long-lived fission products are not easily leached from either high or relatively low density UO_2. (T11g; U, Mo)

314-T.* The Use of Titanium as a Corrosion Resistant Material in Chemical Engineering. *Corrosion Prevention and Control*, v. 5, June 1958, p. 37-39.

Used for gas/water nozzles handling sea-water saturated with SO_2 and operating in hot gas containing SO_2, titanium was untouched after

15 months' service, as compared with the short life of silicon-iron. Where Ti has replaced low-alloy and stainless steels for making certain gas compressor valve plates and springs, no failure has so far occurred after more than 18 months' continuous service. Other Ti components in service include thermo-pockets, stirrers, heating and cooling coils, wire meshes and filter plates and pump impellers. (T29, R4b, R7k; Ti-b)

315-T. Joint Design for Titanium Missile Applications. Pt. 2. B. L. Baird and C. W. Handova. *Industry and Welding*, v. 31, Mar. 1958, p. 56-58.

(Conclusion.)
(T24e, K1a, 17-51; Ti-b)

316-T. Current Experimental Work With Sintered Oxide as a Cutting Tool. H. Eckersley and R. N. Cook. *Institution of Production Engineers, Journal*, v. 37, June 1958, p. 341-362.

Analysis of American, European and Russian progress. Sintered oxides are compared with carbides in various applications. 16 ref. (T6n; SGA-j)

317-T. Titanium in Chemical Plant. *Light Metals*, v. 21, June 1958, p. 180-181.

(T29; Ti-b)

318-T. Road Tankers in Aluminum. *Light Metals*, v. 21, June 1958, p. 184-185.

(T21a; M-b)

319-T. High-Strength Structural Sandwich Construction. W. E. Dirkes. Digest from "ASME Design Engineering Conference Paper 58-MD-10", *Mechanical Engineering*, v. 80, July 1958, p. 72-73.

Principal benefit of sandwich construction gives a greater section modulus per unit of density than a conventional beam or panel of solid material. Also, maximum moment developed is resisted by high tensile stress and high compressive stress in the faces. (T-general; 7-59)

320-T.* Metallurgical Factors in the Design of Hydraulic Equipment for Elevated Temperature Application. A. Mars and N. M. Lazar. Digest from "ASME-ARS Joint Aviation Conference Paper 58-AV-11", *Mechanical Engineering*, v. 80, July 1958, p. 75.

Factors controlling the use of metals in the temperature range 400 to 900° F. For high stressed and wear parts, toolsteel-grade steels show promise. Cast irons show satisfactory structural stability in the temperature range for some wear applications and for structural parts and bodies. Nonferrous alloys must be selected with great care, since the temperature range of their usefulness is limited. (T4c, Q-general, 2-62, 17-51)

321-T. Niobium in Aircraft Gas Turbines. *Metal Industry*, v. 92, June 27, 1958, p. 527-528.

(T24b; Cb, SGA-h)

322-T. Plastics Impregnated Sintered Bronze. *Metal Industry*, v. 92, June 27, 1958, p. 529.

Porous sintered bronze bearings, impregnated with polytetrafluoroethylene, have advantages where bearings must operate for long periods without replenishment of lubricant, and where oil or grease may be objectionable or unable to withstand relatively high temperatures. Bearings of this type, designated "Polyslip," now being made by Bound Brook Bearings Ltd., have a porous bronze matrix impregnated with polytetrafluoro-ethylene and have a superficial layer of polytetrafluoro-ethylene on the bearing surface. (T7d; SGA-c)

323-T. Aluminum Engines—Design for Modern Fabrication. James M. Smith and Richard M. Smith. *Society for Automotive Engineers, Preprint* 68A, 1958, 25 p.

Suggests approach to problems of Al engine design. (T21b, 17-51; Al-b)

324-T. Stainless Toilet Ball Cock New Design Concept. *Western Metalworking*, v. 16, Mar. 1958, p. 23-26.

(T10k, 17-21, 17-27, SS)

325-T. (German.) Recent Development of High-Temperature and Corrosion Resistant Materials. F. Skaupy. *Fertigungstechnik*, v. 8, Apr. 1958, p. 161-163.

Different types of materials developed for resisting high temperatures and corrosion. (T-general, R-general, 2-62, SGA-g, SGA-L)

326-T.* (French.) Work in France on Production and Study of Large-Size Fittings in Titanium Alloy. El Gammal. *N. A. T. O. Consulting Commission on Aircraft Research and Manufacture, Report 97*, Apr. 1957, 44 p.

Production and design studies carried out on "piano" wing fittings of SO 4050 Vautoir II. Tests on cut-out sections provided data on usual tensile properties and their variation at low temperatures, fatigue strength, effect of stress-relieving heat treatment, strength of notched test pieces under constant load. Although mechanical properties still need improvement, it appears possible to use Ti alloy fittings on transonic aircraft. (T24a, 17-57, Q-general; Ti-b)

327-T. Ceramic Tooling. *Aircraft Production*, v. 20, July 1958, p. 274-282.

Use of ceramic cutting tips in commercial practice results in savings over conventional methods. (T6n; SGA-5, 6-70)

328-T. The Behavior of Sliding Bearings. R. A. Langdon. *Tooling and Production*, v. 24, July 1958, p. 38-41.

Slide designs should be restudied in light of our present knowledge of materials and slide mechanics. Higher cost of newer materials can be offset by reduction of machining time required to prepare them and by the fact that wear and consequent replacement of costly parts is reduced. (T7d, Q9)

329-T. Investigation of Chromium-Manganese Austenitic Steels. A. S. Panicheva. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 23-27. (Henry Brutcher, Altadena, Calif., Translation no. 4219.)

Study to determine usefulness of Cr-Mn austenitic steels for bolts in superheated steam installations. Steel No. EI 729 meets the requirements of high yield point, heat resistance and satisfactory machinability. After 1000 hr. aging at 550-650° C., its shock resistance is stabilized at 4.5 kg. per sq. cm. 10 ref. (T7f, Q-general, 261; SS)

330-T. (French.) Utilization of Light Alloys in the Building Industry. R. Gauvry. *Corrosion et Anticorrosion*, v. 6, June 1958, p. 203-210.

Properties of Al and its alloys, particularly resistance to corrosion by atmospheric agents, and the characteristics of light alloys which are important in building construction. Use for various parts of buildings. (T26n, 17-57; Al-b)

331-T. (French.) Galvanized Steel in Buildings and Public Works. J. R. Rouff. *Corrosion et Anticorrosion*, v. 6, June 1958, p. 211-216.

Characteristics of Zn coatings, their mode of protection, performance and general outlook of the possible application of galvanized steel in building and public works construction. (T26n, 17-57; L16; ST, Zn)

332-T. (French.) Lead in the Building Industry. Jean Chauvin. *Corrosion et Anticorrosion*, v. 6, June 1958, p. 223-228.

Water tightness, malleability, soldering ease, high density, chemical stability, etc., that favor use of Pb in building construction in form of laminated sheets or pipes. Sound insulating properties; application in nuclear installations for protection against radioactivity. (T26n, T11, 17-57; Pb)

333-T.* (French.) Steels for Welded Structures and Pressure Vessels. G. P. Smedley. *Revue de Metallurgie*, v. 55, Apr. 1958, p. 323-332.

Requirements of routine test to determine notch toughness of some types of steel suitable for welded construction; influence of stress during service, operating temperature (in case of pressure vessels), construction conditions, residual stress, stress-relieving heat treatment, quality of workmanship. 22 ref. (T26q, 17-57, Q-general; ST, 7-51)

334-T. (German.) Hard Metal Tools for Coal Mining. K. Jaeger. *Bergbautechnik*, Jan. 1958, p. 24-27.

Application of carbide-tipped tools for drilling in mines. (T28j, 17-57; 6-69)

335-T. (German.) Tantalum for Chemical Equipment. Herbert Meyll and Hermann Speidel. *Chemie-Ingenieur-Technik*, May 1958, p. 337-340.

(T29, 17-57; Ta)

336-T. (German.) Aluminum Paste. J. K. Hartmann. *Farbe und Lack*, Feb. 1958, p. 77-78.

Dust-free Al pigment. (T29c, 17-57; Al)

337-T.* (German.) Materials for Nuclear Reactors. H. Lachner. *Metall*, v. 12, May 1958, p. 387-395.

Survey of various reactor materials and their properties under severe heat conditions. Besides metallic fuel elements, sintered ceramic elements from carbides, borides, silicides and nitrides proved very promising because of their heat conducting properties and strength under elevated temperatures. (T11, 17-57)

338-T. (German.) Sea Water Resistant Winch in Light Alloy. H. Heinemann. *Schweissen und Schneiden*, v. 10, June 1958, p. 226-227.

Inert gas welding in construction of ship's superstructures of Al. (T22j, K1d; Al)

339-T. (German.) Modern Turntable in Hollow Box Construction for Railway Engines. Ernest Schellhöh. *Schweissen und Schneiden*, v. 10, June 1958, p. 233-237.

Fully welded turntable has proved successful. (T23q, K-general)

340-T. (German.) Gas Welded Portable Halls Made of Light Alloys. H. H. Grix. *Schweissen und Schneiden*, v. 10, June 1958, p. 241-242.

Gas welded and brazed structures from Al-Mg-Si alloys. (T26n, K2, K8; Al, Mg, Si)

341-T. (German.) Packing Foils. *Seifen, Oele, Fette, Wachse*, Mar. 5, 1958, p. 123-124.

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

Symposium covering synthetic foils, Al foils, coated materials, welding of foils, adhesive joining, automatic manufacture, printing on foils, durability of packing foils. (T10g, 4-56)

342-T. (German.) **Production of Taper-Shank Reamers.** Rohner. *Technica*, Jan. 17, 1958, p. 63-65.
(T6n)

343-T. (German.) **Bearings and Bushings of Sintered Metal.** *Technik und Betrieb*, Feb. 1958, p. 27-29.
(T7d, 17-57; 6-72)

344-T. (German.) **Circular Blades for Cold Sawing Machines.** *Technik und Betrieb*, Mar. 1958, p. 39.
(T6n)

345-T. (German.) **Cast Steel and Malleable Iron in Light Construction.** Karl Roesch. *VDI-Berichte*, v. 28, 1958, p. 43-48.
(T-general, 17-57; CI-s, ST)

346-T. (German.) **Nodular Cast Iron Gearwheels.** G. Niemann and H. Rettig. *VDI-Berichte*, v. 27, 1958, p. 39-46.
Application in load range of hardened and unhardened gearwheels. 5 ref. (T7a, 17-57; CI-r)

347-T. (German.) **Cast Crankshafts.** K. Bandow. *VDI-Berichte*, v. 27, 1958, p. 47-53.
(T21c; CI)

348-T. (German.) **Light Metals and Light Construction.** Gustav Guertler. *VDI-Berichte*, v. 28, 1958, p. 49-57.
42 ref. (T-general, Q-general, 17-57; Al, Mg)

349-T. (German.) **Examples of Applications of Nodular Cast Iron.** H. Muehlberger. *VDI-Berichte*, v. 27, 1958, p. 55-59.
(T-general, 17-57; CI-r)

350-T. (German.) **Theory of Friction Bearing Lubrication.** Heinrich Ebeling. *VDI-Zeitschrift*, v. 100, Jan. 11, 1958, p. 46-47.
(T7d, 18-73)

351-T. Tool Up for High-Speed Cutting. Pt. 2. W. G. McIntosh. *Canadian Metalworking*, v. 21, June 1958, p. 22-23.
Potential of ceramic cutting tools. (T6n; SGA-j, 6-70)

352-T. Percussion Drill Steel Facts of Life. *Engineering and Mining Journal*, v. 159, Mid-June 1958, p. 110-113.
Mechanism of failure in drill steel. (T28j; Q-general; ST)

353-T. Chemical Plant in Titanium. R. J. Watkins. *Industrial Chemist*, v. 34, June 1958, p. 282-286.
8 ref. (T29, 17-57; Ti)

354-T. Sinter Alumina for Cutting Tools. Felix Singer and Sonja S. Singer. *Interceram*, no. 6, 1957, p. 22-25.
11 ref. (T6n, 17-57; SGA-j, 6-70, Al)

355-T. Recent Structural Aluminum Developments in Belgium. H. R. Craggs. *Light Metals*, v. 21, July 1958, p. 213-218.
(T26, 17-57; Al-b)

356-T. Corrugated Metallic Cable Sheath. K. Andresen, F. Dias and N. D. Kenney. *Power Apparatus and Systems*, no. 36, June 1958, p. 169-180.
Steel sheath manufacturing techniques; corrosion resistance and mechanical properties. (T1b, 17-57; ST)

357-T. New Spring With Restricted Coil Diameter Carries Higher Load. *Western Metalworking*, v. 16, July 1958, p. 49-50.
(T7c)

358-T. (French.) **Boiler Tanks.** J. Theodore. *Soudage et Techniques Connexes*, v. 12, May-June 1958, p. 211-216.
Fabrication of boiler tanks; steel used, acceptance tests carried out on plates, forming, welding, preheating and heat treatments, inspection of welds. (T26q, K-general; ST)

359-T. (German.) **Properties of Ageable Lead Bearing Metals and Their Application in Railroad Cars.** B. Beyer and H. Seliger. *Deutsche Eisenbahntechnik*, v. 6, May 1958, p. 215-219.
23 ref.
(T7d, T23p, 17-57; Pb *Ba, Mg*)

360-T. (German.) **Oxide-Ceramic Cutting Material.** F. Pühler and R. Wagner. *Industrie-Anzeiger*, v. 80, June 13, 1958, p. 673-676.
(T6n; SGA-j, 6-70)

361-T. (German.) **Electrodes for Spark Erosion Die Machining.** H. Obrig. *Industrie-Anzeiger*, v. 80, June 13, 1958, p. 685-688.
(T1f, G24a)

362-T. (German.) **Structure and Tool Life of Ceramic Cutting Tools.** R. Fleck and M. Gappich. *Industrie-Anzeiger*, v. 80, June 13, 1958, p. 689-692.
7 ref. (T6n; SGA-j, 6-70)

363-T. (German.) **Flame Sprayed Friction Bearings.** H. D. Steffens. *Industrie-Anzeiger*, v. 80, June 20, 1958, p. 719-722.
Economic and technical advantages of metal sprayed friction bearings; choice of metal; production techniques; tests and their results. 3 ref. (T7d, L23)

364-T.* (French.) **Use of Structural Elements Made From Rolled Sheets.** Cedric Marsh. *Revue de l'Aluminium*, v. 35, May 1958 p. 523-531.
Method for calculating rupture stresses. Fabrication processes of circular and rectangular tubes. How to eliminate local buckling that develops from riveting, fastening and welding of structural elements. (T26n, T26p, Q25; Al-b, 4-53, 7-51)

365-T. Cemented Carbide Turning Tools. A. G. Gardner. *Mechanical World and Engineering Record*, July 1958, p. 308-313.
Recommendations on mounting of tool tips, side and edge rake, chip breakers, cutting speed, feed, depth of cut, coolants and wheel grinding. (T6n, 6-69)

366-T. (French.) **Alkali Batteries With Sintered Plates.** D. Stanimirovitch. *Revue du Nickel*, v. 24, Apr-May-June 1958, p. 39-46.
Nickel-cadmium batteries are produced by a method involving the sintering of Ni powder to create a highly porous surface, and the impregnation of this surface with cadmium hydrate for the negative electrode and nickel hydrate for the positive electrode. (T1; Ni, Cd, 6-71)

367-T. (German.) **Material Problems in the Construction of Reactors.** F. Lihl. *Radex-Rundschau*, no. 1, Feb. 1957, p. 482-494.
28 ref. (T11)

368-T. (Russian.) **Effect of Heat Treatment on Chemical Composition of Steels Used for Transformers and Other Electrical Equipment.** G. N. Shubin. *Stal'*, June 1958, p. 559-560.
(T1j, ST, Si, 2-60, 2-64)

Plant Equipment

371-W.* (French.) **Use of Spheroidal Cast Iron in Die Casting Zinc and Aluminum Alloys.** Luciano Oltrasi. *Fonderie*, no. 145, Feb. 1958, p. 75-78.
Spheroidal cast iron parts have longer service life than those made of ordinary cast iron in following applications: crucibles for melting or holding Al or Zamak in electric furnaces; pistons in cold chamber machines for die-casting Al; goosenecks of hot chamber machines for Zamak. 3 ref.
(W19f, W18h, E13, 17-57; CI-r)

372-W.* **A New Combustion Process for Temperature Uniformity in Heat Treating Furnaces.** F. C. T. Daniels and Steve Stasko. *Iron and Steel Engineer*, v. 35, July 1958, p. 85-91.
Burners designed to use excess air give improved temperature uniformity and control. Outstanding features are circular heated air motion, positive furnace pressure, forced convection. Process is applicable to any heating or heat treating operation within range of ferrous heat treating temperatures, including mold drying. (W27g, S18s)

373-W. Vacuum Die Casting Equipment. Meyer R. Tenenbaum. *Die Casting Engineer*, v. 2, Mar. 1958, p. 15.
(E13, 1-73, W19n)

374-W. Evaluation and Synthesis of Test Data for Materials Used in Boilers and Steam Pipes for High Temperature Service. S. C. Roy. *Institution of Engineers (India), Journal*, v. 38, Apr. 1958, p. 755-767.
For a temperature range between 800 and 900° F., evaluation of working stresses should take into consideration the creep properties of a material, but should be limited to the criteria for evaluation of stresses at lower temperatures. 20 ref.
(W11g; ST, 17-57)

375-W. The Fully Continuous Medium Strip Mill of Th. Wuppermann. Heinrich Lampmann. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 160-167. (Iron and Steel Institute, Translation no. 899.)
Previously abstracted from original. See item 155-W, 1958.
(W23c, F23, 1-61)

376-W. Continuous Pusher-Type Heating Furnace With Full Automatic Control and Ceramic Skid Rails. Fritz Fechter. *Stahl und Eisen*, v. 78, Mar. 6, 1958, p. 299-303. (Iron and Steel Institute, Translation no. 1023.)
Previously abstracted from original. See item 250-W, 1958.
(W20h, F21b)

377-W.* **Ceramic Tooling.** Herbert Schwartz. *Modern Machine Shop*, v. 31, Aug. 1958, p. 70-75.
Uses and advantages of ceramic materials in producing tooling for high temperature. (W25b; NM-f)

378-W.* (Italian.) **Manufacture of Aluminum Heat Exchangers.** *Alluminio*, v. 27, June 1958, p. 289-306.
Descriptions and photographs of numerous American and European devices and components; types of exchangers and their applications; physical requirements; fabrication techniques. Tables of mechanical and technological characteristics of numerous Al alloys, machining norms and other data. 17 ref.
(W13b, 17-57; Al-b)

379-W.* (English.) **Establishing of a Relation Between the Life of Ingot Molds and the Quality of Cast Iron for Ingot Molds.** Traian Dumitrescu.

Revue de Métallurgie (Bucarest), v. 1, 1956, p. 55-62.

On the basis of tests conducted on 99 ingot molds of compositions which cover the range used in practice, it is found that a well-defined, nearly parabolic, relation exists between the life of the ingot molds and the combined effect of the Si, Mn and S, represented by the ratio k of Si to free Mn. The life of the mold is a minimum for k between 7-9 and increases when the ratio drops below 7 or rises above 9. To obtain optimal life the only practically realizable solution is to increase the Mn content so that k be around unity. 4 ref.
(W19c, 17-57; CI, 17-52)

380-W. Ingot Molds of Magnesium-Treated Spheroidal-Graphite Cast Iron. G. A. Pisarenko. *Metallurg*, Dec. 1956, p. 16-19. (Henry Brutcher, Altadena, Calif., Translation no. 4203.)

Recommended cupola melting practice for mold iron; make-up of charge. Method and set-up for Mg treatment of cupola iron; composition of iron. Technique of casting the ingot molds; how to avoid subcutaneous cavities; how to heat treat the molds. Typical microstructure of mold iron. Service life and production costs of new molds compared with molds of ordinary gray iron. (W19c, 17-57, E25q; CI-r, *Mg*)

381-W.* (German.) **Operation of Graphite Melting Crucibles.** Alfred Naundorf. *Giessereitechnik*, v. 4, Apr. 1958, p. 86-91.

Composition and properties of crucibles, installation in furnaces; effect of fuel on crucibles; use of fluxes; treatment of crucibles after usage. (W18h, 1-52, E10p)

382-W. A Modern Forging Press and Its Control. Otto Hoffmann and Alex Krynytzky. *Iron and Steel Engineer*, v. 35, July 1958, p. 81-93.

(W22p, 1-52)

383-W. Standardized Component Parts for Heavy Duty Mill Type Cranes. M. R. Bowerman and E. R. Madison. *Iron and Steel Engineer*, v. 35, July 1958, p. 104-111.

(W12q)

384-W. Card Programming Control of Rolling Mills. Pt. 1-2. Robert W. Holman, R. G. Beadle and W. E. Miller. *Iron and Steel Engineer*, v. 35, June 1958, p. 113-119.

(W23, 18-74)

385-W. (German.) **Hardening in New Electric Furnaces.** Th. Tuerk. *Elektrowaerme*, July 1957, p. 260-268.

Furnaces with controlled atmosphere. (W27n, 1-52)

386-W. (German.) **New Hot Strip Rolling Mill of Borsig AG in Berlin-Tegel.** Walter Stenger and Olaf Dahlke. *Stahl und Eisen*, v. 78, June 12, 1958, p. 812-820.

(W23c, 18-67, 1-52)

387-W. (Italian.) **Induction Furnaces for Ferrous Alloys in Italy and Other Countries.** E. Calamari. *Fonderia Italiana*, v. 7, Apr. 1958, p. 129-133.

6 ref. (W17a; Fe)

388-W. (Italian.) **High-Frequency Welding Machines for Arc Welding.** Emilio Biffi. *Rivista Italiana della Saldatura*, v. 10, Jan-Feb. 1958, p. 3-7.

(W29a, K1, 1-52)

389-W. Temperature Uniformity in Heat Treating Furnace. F. C. T. Daniels and Steve Stasko. *Industrial Heating*, v. 25, July 1958, p. 1342-1346.

A new combustion process for maintaining temperature control and uniformity in heat treating furnaces involves a different approach to the placement of burners and to their method of firing. (W27g; X9, 1-52)

390-W. Storage, Piping and Control of Oxy-Acetylene. D. L. Caldwell. *Industry and Welding*, v. 31, Aug. 1958, p. 38-39.

(W29e, K2h)

391-W. Metallurgy in Nuclear Engineering. J. Burkett. *Metallurgia*, v. 58, July 1958, p. 32-36.

Materials of construction, metallurgy of reactor fuels, welding of reactor materials. 96 ref.
(W11p, 17-57, 10-54)

392-W. Jigs and Fixtures for Heat Treatment and Other Metallurgical Operations. L. G. H. Palethorpe. *Metal Treatment and Drop Forging*, v. 25, July 1958, p. 275-282.

Handling methods in heat treatment, quenching and related operations. (W12s, W28a, 1-52)

393-W. Numerical Control—for Big or Small User. Peter Trippe. *Metalworking Production*, v. 102, July 11, 1958, p. 1209-1212.

Rapid programming, low scrap rate, high speed of tape-controlled machining equipment makes its use feasible for even small firms.
(W25; 18-74)

394-W. Extrusion Handling Systems Save Money, Time. Kim Darby. *Modern Metals*, v. 14, July 1958, p. 66-67.

"Walking beam" method of moving extrusions. (W12r, 18-74; 4-58)

395-W. Determination of Minimum Consumption of Electric Power in Arc Furnaces. N. A. Markov. *Stal'*, v. 17, May 1957, p. 419-422. (Iron and Steel Institute Translation no. 579.)

Previously abstracted from original. See item 6-W, 1958.
(W18s, 16-61)

396-W. The New Light Section and Wire Rod Mill of the Klockner-Huttenwerk Haspe in Hagen-Haspe. Arthur Weyel and Hans Weide. *Stahl und Eisen*, v. 77, Oct. 17, 1957, p. 1464, 1476. (Iron and Steel Institute Translation no. 749.)

Previously abstracted from original. See item 43-W, 1958.
(W23d, F23)

397-W. Control and Regulation of the Twin Drive of a Heavy Plate Mill. Otto Martin. *Stahl und Eisen*, v. 77, Oct. 31, 1957, p. 1607-1610. (Iron and Steel Institute Translation no. 770.)

Previously abstracted from original. See item 43-W, 1958.
(W23b, W23n, 4-53; ST)

398-W. Electrical Resistance Heating for the Processing of Steel. Wilhelm Stich. *Stahl und Eisen*, v. 77, Apr. 4, 1957, p. 394-408. (Iron and Steel Institute Translation no. 863.)

Previously abstracted from original. See item 183-W, 1957.
(W27, J-general)

399-W. (French.) **Low-Shaft Blast-Furnace.** H. Malcor. *Revue Technique Luxembourgeoise*, v. 50, Apr-June 1958, p. 65-77.

Use of ore fines; agglomeration of fine ores by vacuum extrusion; types of fuel; economic values.
(W17h, D1)

400-W. (German.) **Design of Ingot Molds for Casting Forging Ingots.** Henriette Vorlova. *Bergakademie*, v. 10, Apr. 1958, p. 245-250.

(W19c, 17-51; ST)

401-W. (German.) **Development of Gas and Electro-Heated Metal Spray Pistols.** K. Kreutzfeldt. *Industrie-Anzeiger*, v. 80, June 20, 1958, p. 714-715.

(W4g, 1-52)

402-W. (Italian.) **Low-Frequency Induction Furnaces in the Electrification of Foundries.** E. Calamari. *Industria Italiana Elettrotecnica*, v. 11, Feb. 1958, p. 43-52.

(W18a, E10)

403-W. (Russian.) **Improvement in Design of Cooling Equipment for Electric Arc Furnaces.** A. I. Sapko and V. P. Dobrov. *Metallurg*, v. 3, May 1958, p. 17-20.

(W18s, W10f)

404-W.* (Russian.) **Possibilities for Increased Output of Soaking Pits.** L. V. Ilovaiskii. *Stal'*, June 1958, p. 537-541.

Increased output can be attained by more efficient organization of stripping, transportation and charging of ingots into soaking pits. This requires that the initial high temperature of ingots be conserved as much as possible up to the moment of their charging. (W20g, A5; ST)

405-W.* (Russian.) **Effect of Mold Making Process on Durability of Ingot Molds.** N. I. Pavlovtseva and L. M. Cherkasov. *Stal'*, June 1958, p. 569-574.

To eliminate cracks in molds, it is essential that mold forms be carefully cleaned, particularly at the joints, that defects on internal and external surfaces as well as solid flanges be removed. Unevenness in walls of 5 to 8 mm. will speed formation of cracks. (W19c)

406-W. The Electric Resistance Furnace. Gerhard Simon. *AEG Progress*, no. 5, 1957, p. 225-233.

Design, applications and classification of various types of resistance furnaces. (W27j)

407-W. (German.) **Coated Electrodes for Manual Arc Welding of Iron.** K. L. Zeyen. *Draht*, v. 9, June 1958, p. 211-217.

Survey of electrode standards in Germany and other countries.
(W29h)

408-W. (German.) **Transportation in Foundries by Means of Ropes and Chains.** A. Hohmann. *Giesserei-Praxis*, no. 10, May 1958, p. 194-195.

(W12, W19)

409-W. (German.) **Developments in Molding Machines in Germany and Other Countries.** Werner Hofmann. *Giessereitechnik*, v. 4, Apr. 1958, p. 75-78, May 1958, p. 97-102.

(W19g)

410-W. (German.) **Improved Gas-Fired Drying Oven.** Fritz Bruun. *Giessereitechnik*, v. 4, Apr. 1958, p. 80-83.

(W19k)

411-W. (German.) **Pressure Die Casting Equipment.** Werner Radehaus. *Giessereitechnik*, v. 4, May 1958, p. 102-106.

(W19f, E13)

412-W. (German.) **Control Devices for Resistance Welding Machines.** Walter Masing. *Schweissen und Schneiden*, v. 10, July 1958, p. 276-281.

(W29c, K3, K9)

413-W. (Russian.) **Increasing the Weight of Bloom Ingots.** A. M. Ofengenden. *Metallurg*, v. 3, June 1958, p. 13-15.

Necessary readjustments in rolling mill to handle heavier ingots (that were enlarged from 2.8 to 3.4 tons) and resulting economies in use of ingot molds.
(W19c, W23a; ST)

414-W. (Russian.) **World's Largest Installation for Continuous Steel Casting.** V. V. Ful'makht and A. G. Chumichev. *Metallurg*, v. 3, June 1958, p. 15-17.

(W10a, D9q)

(*)Articles Available Through Photocopy Service; See Coupon, p. 75.

Instrumentation

Laboratory and Control Equipment

59-X.* An Automatic Gage Control System for Tandem Cold Mills. N. S. Walker, J. W. Cook and J. W. Wallace. *Iron and Steel Engineer,* v. 35, July 1958, p. 124-132.

Controller consisting of pre-amplifier, integrator and power amplifier is standard in design and can be applied to any steel rolling mill where gage can be controlled by tension; applicable to Al mills where gage is controlled by tension or mill speed, or by a combination of both. (X20c, W23)

60-X.* Temperature Controller for Heat-Treatment of Pipe Welds. D. Birchon. *Welding and Metal Fabrication,* v. 26, July 1958, p. 256-258.

Prototype portable instrument to control the heat-treatment temperature of local areas of completed structures in the temperature range 600° C. upwards, within 10° C. The equipment views a small area of the hot surface directly through the heating flame, and on opposed current control circuit which gives a full-scale meter deflection for the working range of 600-900° C. 5 ref. (X9s, J-general, 4-60, 7-51)

61-X.* (German.) **Surface Treatment of Aluminum for Electrolytic Condensers.** P. Werner. *Nachrichtentechnik,* v. 8, June 1958, p. 269-276.

Surface treatment of Al is one of the most important aspects in the production of condensers; a reduction in the size of the case is made possible for the miniature type used in communications. Methods of treatment are mechanical, spraying, chemical and electrochemical. The electrochemical process has the best reproducibility. (X15, T1e, L-general; Al-b, 17-57)

62-X.* (German.) **Experiments and Observations on the Development of an Oxide-Type Thermo-Element.** Wilhelm Anton Fischer and Gert Lorenz. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 293-300.

For the measurement of temperatures between 300 and 1750° C. thermo-elements from Pt/Cr_2O_3/Cr_2O_3 + 1% TiO_2/Pt representing a semiconductor were tried and thermoforces and thermovoltages were observed. Reversibility and reproducibility were satisfactory even after 24 hr. of heating. The thermovoltages were extrapolated up to 2100° C., beyond which the thermoforces apparently become negligible. Tables and diagrams are given for thermoforces and voltages as function of temperature. 12 ref. (X9g, 17-57; Cr, Pt, Ti)

63-X. (German.) **Application of Scintillation-Counters on "Counting Tube Goniometers".** Franz Bollenrath and Hans Krings. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 309-312.

For microstructure investigations on Cu, Al, carbonyl iron and on steels with about 16% Cr and 30% Ni, a sodium iodide scintillation counter together with molybdenum rays was used. The ratio between line intensity and background intensity was improved, permitting a considerably better discrimination against fluorescent rays and retarding rays. Types of counting instruments are compared in tables. 5 ref. (X27c, M23n; SS, *Cr, Mo, Ni*)

64-X. (German.) **Magnetic Materials in Heavy-Current Engineering.** O. Twerdy. *Deutsche Elektrotechnik,* Dec. 1957, p. 103-104.

(X11g, 17-57; SGA-n)

65-X. (German.) **Powder Metal Permanent Magnets.** H. Fahlenbrach. *Deutsche Elektrotechnik,* Dec. 1957, p. 518-524.

15 ref. (X11g, 17-57; SGA-n, 6-71)

66-X. (German.) **Manganese-Bismuth Permanent Magnets.** A. B. Altmann. *Deutsche Elektrotechnik,* Dec. 1957, p. 525-527.

Methods of production and characteristics. 16 ref. (X11g, 17-57; Bi, Mn, SGA-n)

67-X. (German.) **New Ultrasonic Pulse Generator for Nondestructive Testing of Material.** Werner Boehme and Hubert Hoetzel. *Siemens Zeitschrift,* Apr. 1958, p. 222-230.

(X8, S13g, 1-52)

68-X. (Japanese.) **Sensitive Dynamometer Equipped With Strain Gages.** M. Honda and M. Kanai. *Mechanical Laboratory, Journal,* v. 11, Mar. 1958, p. 61-66.

Measurement of comparatively small cutting forces. General description of construction; characteristics, experimental results. (X28h, G17)

69-X. Applying Infrared Analyzers to Control Furnace Atmospheres. J. L. Garrison. *Automation,* v. 5, June 1958, p. 46-48.

(X7j; W27n, 1-52)

70-X. Weighing Enters New Fields Via Digital-Data Scales. G. L. McKenna. *Iron Age,* v. 182, July 24, 1958, p. 81-83.

Newest scales will transmit weight data electronically to a variety of remotely located business machines —typewriters, tape punches, adding machines, and digital controllers. (X20g, A5, 18-74)

71-X. Measuring Techniques for Controlling Electrical Installations in Steel Works and for Detecting Faults. Kurt Stahl. *Stahl und Eisen,* v. 78, Jan. 23, 1958, p. 94-100. (Iron and Steel Institute Translation no. 881.)

Previously abstracted from original. See item 28-X, 1958. (X10, X25, D-general)

72-X. (German.) **Materials for Temperature Compensation of Measuring Instruments.** Anton Schwarz. *VDI-Zeitschrift,* v. 100, Jan. 1, 1958, p. 23-24.

(X-general, 2-61)

73-X. Apparatus for Precise Determination of Dynamic Young's Modulus and Internal Frictions at Elevated Temperatures. M. E. Fine. *Review of Scientific Instruments,* v. 28, Aug. 1957, p. 643-645.

Apparatus for determining Young's modulus and internal friction of metals at temperatures to 800° C. (X28, Q21, Q22, 2-62)

74-X. (Russian.) **Complex Automatic Control in Iron and Steel Industry.** *Stal',* June 1958, p. 481-485.

(X-general, D-general)

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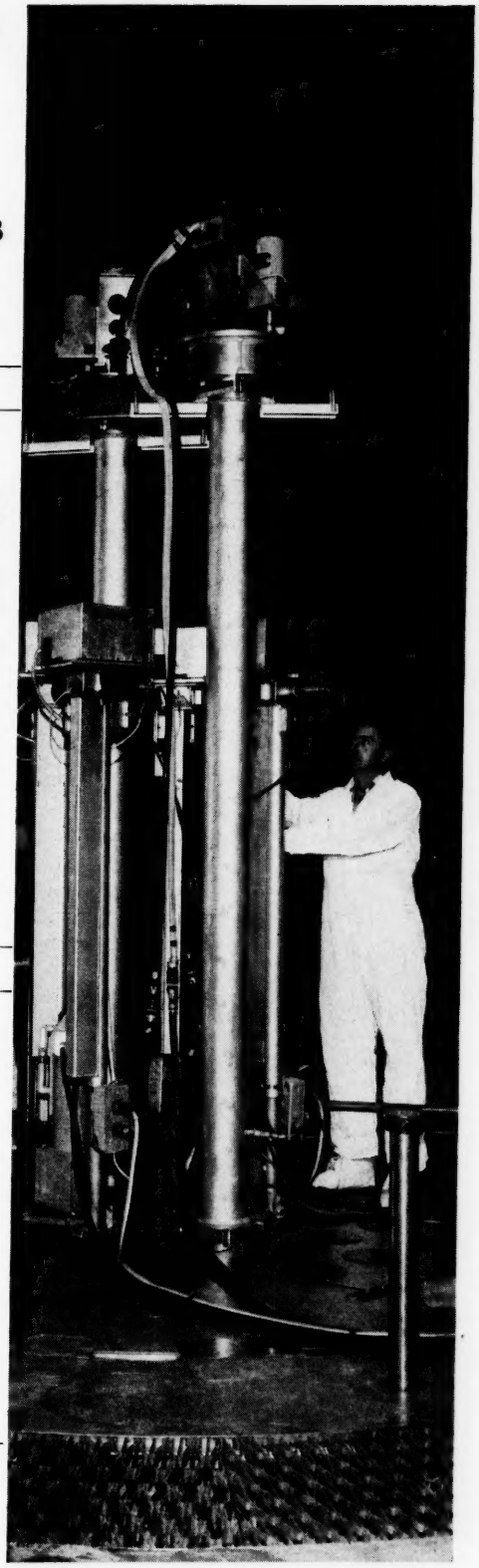

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KAPL Metallurgist Richard L. Mehan taking a reading on a Zirconium alloy specimen being tested in a special strain-fatigue apparatus. Conceived, developed and built at KAPL, this new apparatus makes it possible to control and measure elastic and plastic strain developed in reactor materials under test. Conventional equipment controls only stress and strain within the elastic region.

MILESTONES IN REACTOR TECHNOLOGY

at The Knolls Atomic Power Laboratory

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Richard L. Mehan is one of several metallurgists working on the development of new and more reliable reactor materials at KAPL. Dick Mehan joined General Electric after graduation from MIT in 1950 and came to KAPL in 1953, following two years of army service. He is also studying advanced metallurgy, evenings at Rensselaer Polytechnic Institute under G.E.'s advanced degree program.

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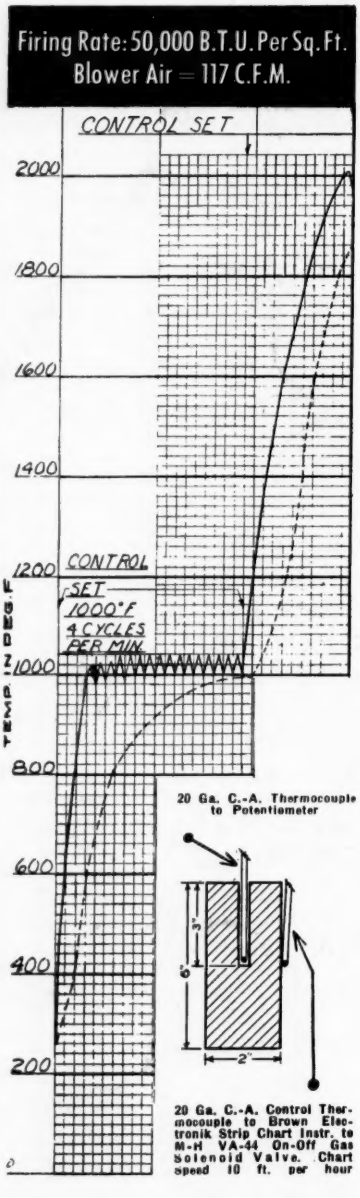

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